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The INDUSTRIAL-ARTS MAGAZINE

NOVEMBER 1924

The Bruce Publishing Company
Milwaukee Wisconsin

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INDUSTRIAL-ARTS MAGAZINE

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Graphic Aids in the Analysis of Carpentry for Teaching

Clyde A. Bowman, Director School of Industrial Arts, Stout Institute, Menomonie, Wisconsin.

IN conducting the course in Industrial Analysis and Organization in the 1924 Summer Session, the writer in grouping the students for the work in charting graphic aids in different trades had Paul C. Nelson, teacher of carpentry and architectural drawing, Vocational School, Racine, Wisconsin, and S. R. Harding, director of industrial arts, city schools, Aberdeen, South Dakota, in the carpentry group. The work of these two men is illustrated in the charts in this article. Mr. Nelson has had ten years' experience in the building trades and six years' teaching experience. Mr. Harding has had one year in airplane boat hull construction, one-half year in carpentry work, and seven years' teaching experience. The graphic record of carpentry analysis, which these two men worked out in connection with the course in analysis and organization, is planned to be of immediate use in connection with the teacher's work in any school where carpentry is taught. It will especially aid the junior high school teacher, the senior high school teacher, and the vocational school teacher in both his day and evening work. Mr. H. M. Hansen and Mr. R. A. McGee, both of the woodworking department of Stout Institute, have assisted in checking the charts.

The constant problem of the industrial teacher is selecting portions of the total in any trade to teach to particular pupils or groups of pupils. The course resulting from this selection is either a try-out course, a unit course, or a series of unit courses virtually including the total breadth of the trade.

In the make-up of the teacher's professional skill each of the three basic elements, i.e., skill in teaching, skill in selection, and skill in the making and use of the analyses, if given graphic aids, usually shows increased efficiency. The graphic analysis of carpentry illustrated in this article is designed to record the inventory analysis of the total to make easily available the selection for various types of carpentry courses. The graphic analysis is also so arranged as to facilitate the recording of this selection of content and to render it easy for the student to measure himself and his record of performance in the trade.

The try-out course in any kind of shop work must carry in it basic tools and materials, basic operations which are applied in typical constructions and typical productions, and these must be taught the student in basic occupational situations so far as possible. In many instances groups of jobs picked from a number of units are put together to make try-out courses; none of the units are completely covered. In picking a try-out course, to determine the breadth of selection and the degree to which the course is representative, consideration must be given to both the basic operations involved and to the classifications of trade content. In the sample courses, listed later in this article, detailed illustration is given to this point.

In any given unit in the trade, in order that the unit course be complete, all of the basic operations in the unit must be involved in the jobs of the unit course, all of the typical productions must be represented in the work given to pupils, and the jobs assigned to the pupils must be representative of the various divisions and classifications in the unit in the trade.

In teaching a series of units for the purpose of giving an individual as complete a course of instruction in the trade as possible in school, some means is necessary for recording a complete inventory of the trade content. The graphic records of analysis in this article do not carry the related information. They do carry all of the things done in the portions of the trade selected. In the sample courses listed later the manner of selecting the related information is illustrated in typical instances. In a study of the three charts, it will be noticed that all three are alike down to and including the divisions of "building trades carpentry." In other words, the upper portion of each of the charts is a duplication of what might be called a master chart. Due to the breadth of work called carpentry in the United States there is necessity for a restriction when planning courses. This restriction takes the form of a selection from the various trade divisions.

In a scrutiny of carpentry as a general classification we notice in the first level under "carpentry" a classification of *workers*. These workers are found in the major carpentry trades as indicated in the second level on the chart. Of these five classifications one is selected, namely, *building* construction, and is carried into detailed analysis. In classifying types of buildings in building construction a condensed record is made of

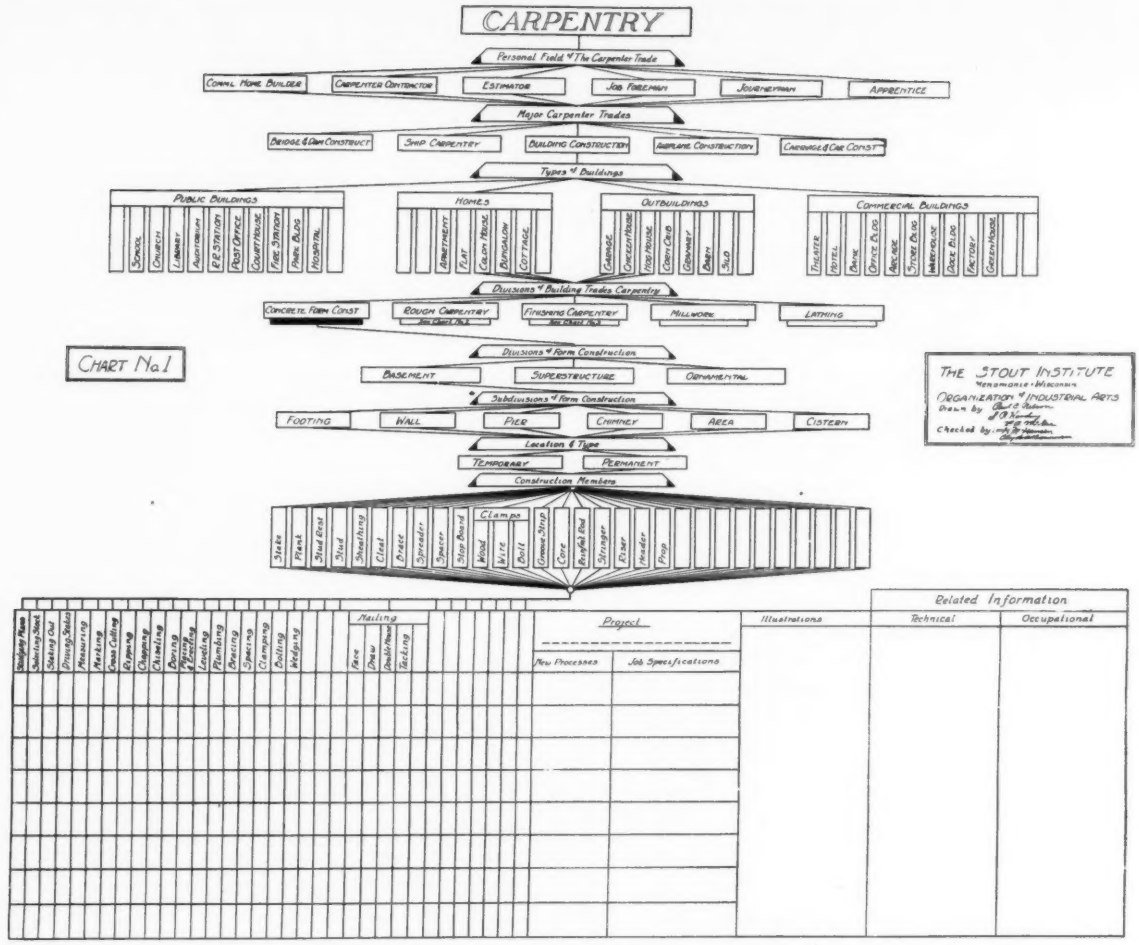


CHART No. 1. DETAILS OF CONCRETE FORM CONSTRUCTION.

large groups. Inasmuch as it is planned to confine the selection in this particular instance to certain types of buildings, those types are indicated by being carried forward to the divisions of *building trades carpentry.*

In considering the divisions of building trades carpentry the five classifications listed include *millwork* and *lathing,* which are sometimes listed as separate trades. Inasmuch as these two, millwork and lathing, are sometimes in other groups, they are not carried forward in this classification. Following the classifications of divisions of building trades carpentry each chart details a particular division—chart No. 1 details *concrete form construction;* chart No. 2 details *rough carpentry;* chart No. 3 details *finishing carpentry.* In each case the unit of work on the chart is related to the classifications above it.

In whatever type of school the teacher is working it will be necessary for him to select groups of jobs to be assigned to the pupils. It is presumed that he selects these groups of jobs with the objects of the pupils in mind. He also selects these jobs in the light of time, equipment, and pupil ability. It is advisable always and sometimes very necessary to have some form of accurate record of a pupil's performance in a given kind of occupational work. This record should show very accurately what basic tools and materials the pupil has worked with, what basic operations of the occupation he has learned to perform, and what typical occupational situations with which he has been acquainted. The charts in Figures 1, 2, and 3 are for the purpose of making such records. They are purposely left blank in the lower part to facilitate their use in checking courses as the teacher works them out.

Figure 4 is a reproduction of the lower part of Figure 2. In this chart has been entered a unit course in hip roof framing. The manner of entering and checking this course is typical of the manner of entering and checking any course in carpentry. If the course instead of being a unit course were a try-out course, more kinds of work would be represented. It is evident that only a rather narrow unit of work or a limited number of jobs can be entered and checked on any one chart because of the limited checking space below the basic operations. Therefore, when entering and checking the jobs in a large unit or in an entire trade, a number of copies of the charts would be necessary or additional entering and checking space may be provided by extending the lower section of the charts.

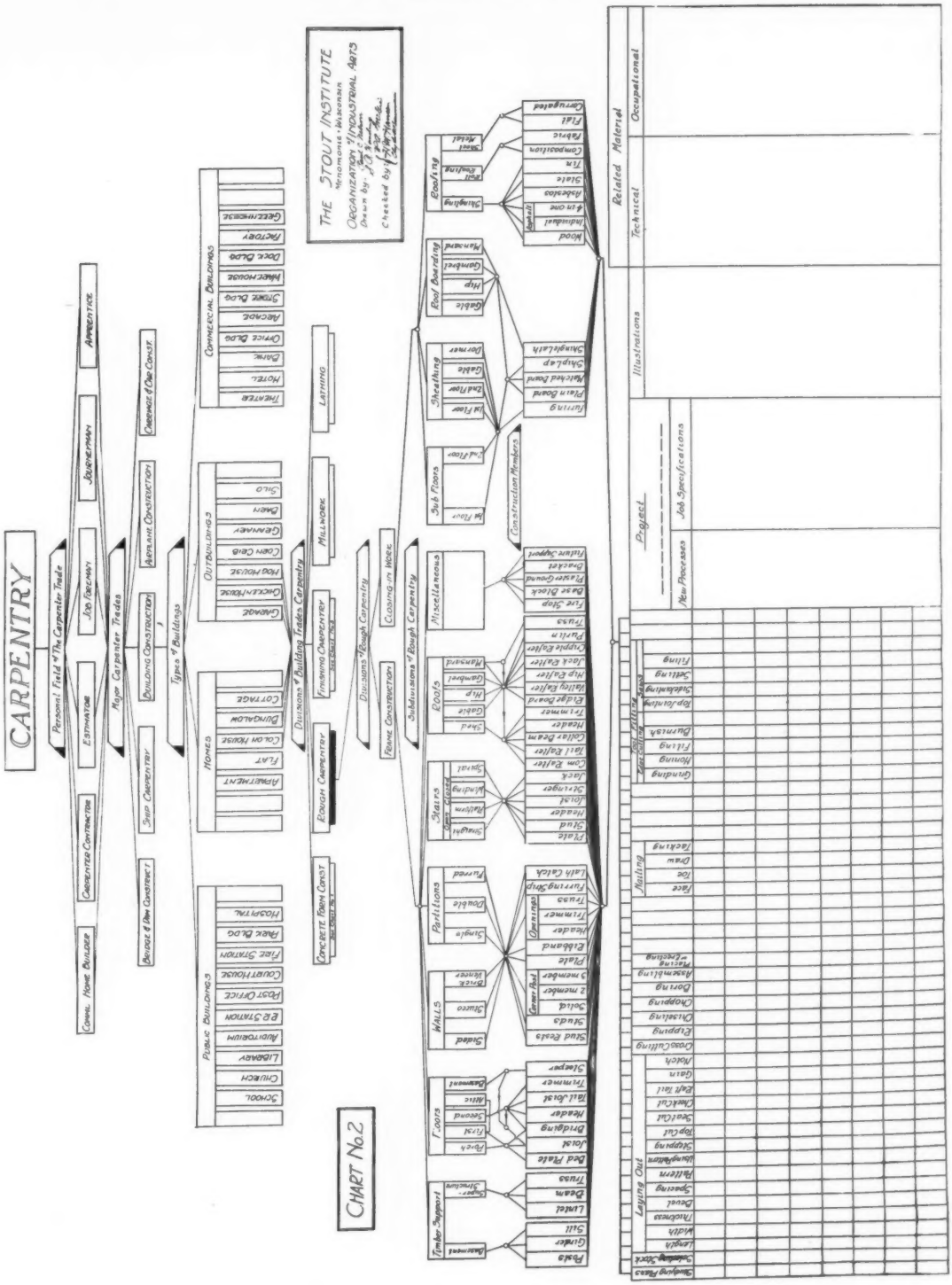


CHART No. 2. ROUGH CARPENTRY.

The particular unit of the divisions of building trades carrying carpentry on each chart is indicated by underscoring with a black rectangle. For instance, in chart No. 2 *rough carpentry* is indicated. For details of *concrete form construction* see chart No. 1. For details of *finishing carpentry* see chart No. 3. The divisions of rough carpentry are termed *frame construction* and *closing-in work*. The *subdivisions of rough carpentry* then follow in terms of minor branches of each subdivision. These are then indicated in classifications of *members* and parts which are used in the different subdivisions of *rough carpentry*. These are indicated in the level termed *construction members*. The next level below construction members is the level showing

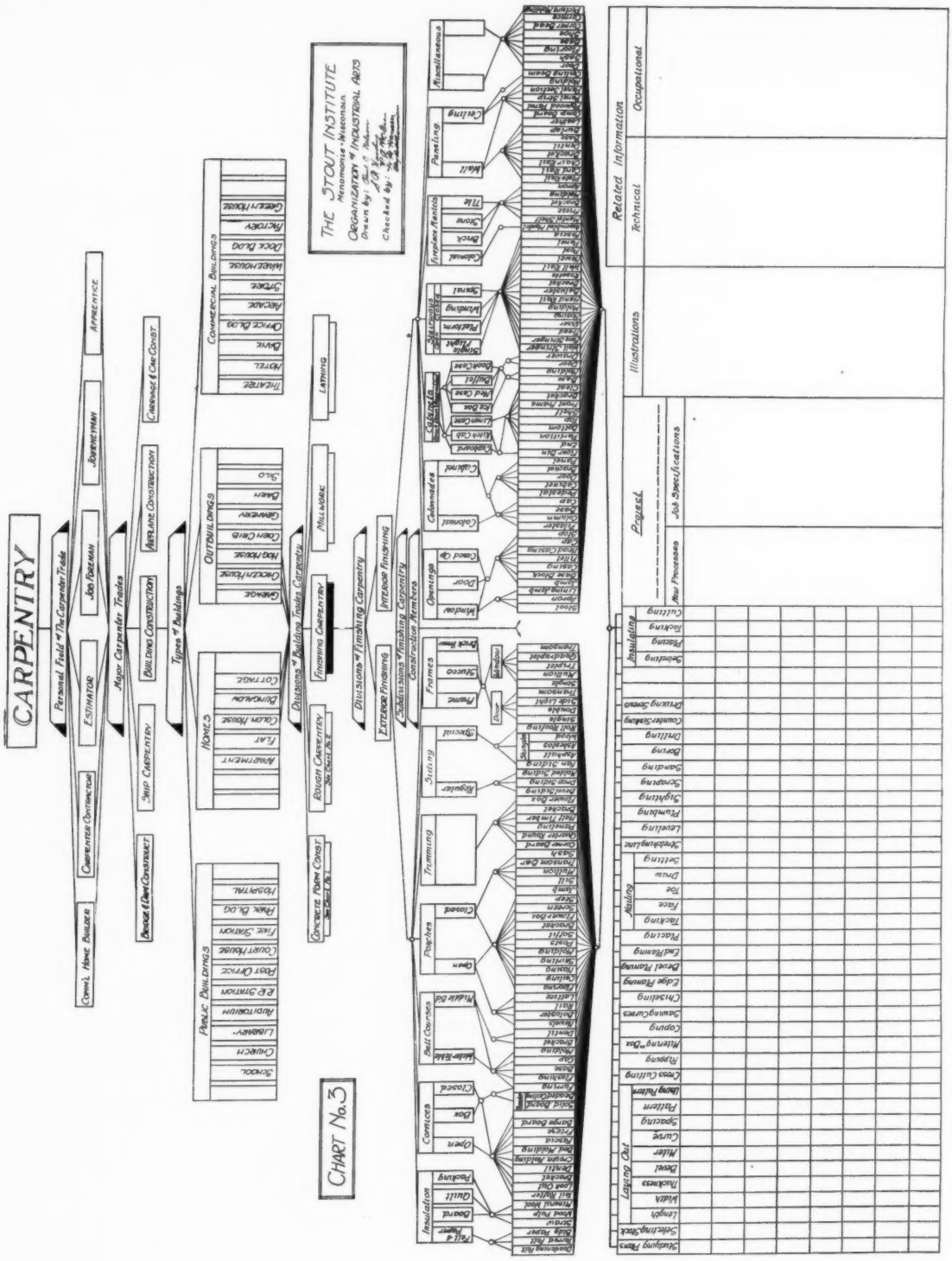


CHART No. 3. FINISHING CARPENTRY.

the basic operations performed in rough carpentry. These basic operations are found, either some or all of them, in any type job in rough carpentry in building trades work.

The steps in entering and checking the unit course in hip roof framing in chart No. 2 follow a definite order and are described in the following paragraphs. (See detailed entries in Fig. 4). The project is to frame a hip roof for a rectangular building. The jobs are listed in a column headed job specifications. These are listed when first entered in the construction order. It is possible after so listing them and after causing all

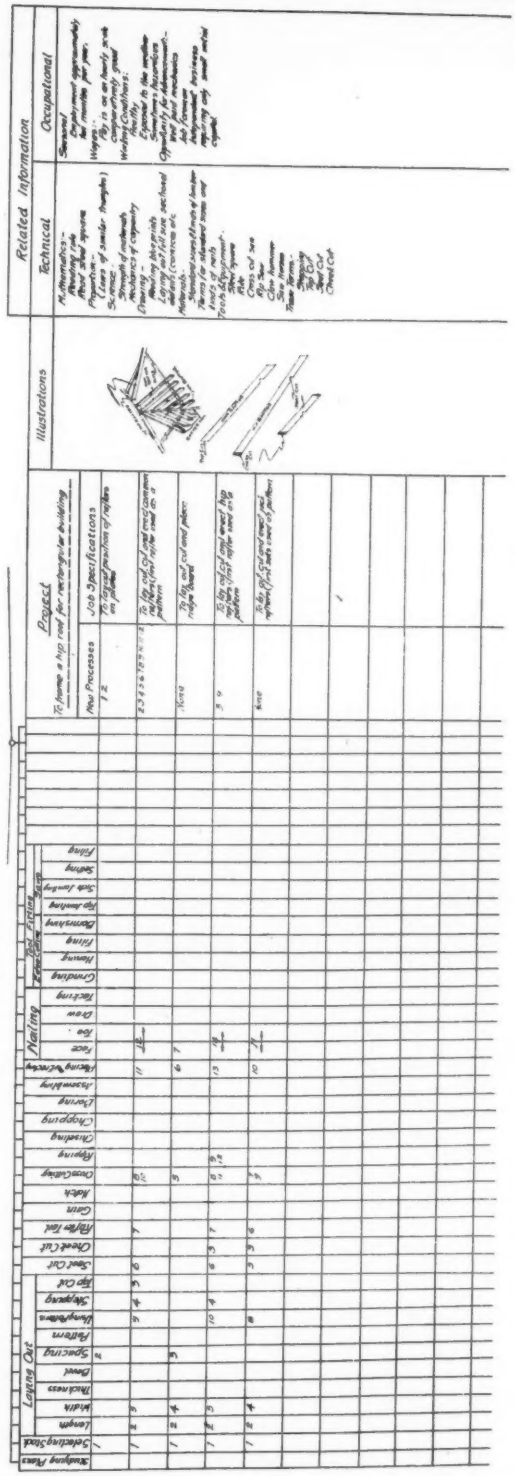


FIG. 4.

of the checking to indicate operations involved that the instructional order may be a little different from the constructional order. In checking the first job listed in the job specification column, a figure 1 is placed at the left of this job under the basic operation which comes first in the job. A figure 2 is placed under the second basic operation, etc. These figures are the ones at the left,hand part of the chart.

In the second job a similar checking is made under the basic operations. In this job—"To lay out, cut, and erect common rafters"—it will be noticed that referring to the numbered spaces to the extreme left:

Step No. 1 is "studying plans."
Step No. 2 is "selecting stock."
Step No. 3 "laying out top cut."
Step No. 4 "stepping."
Step No. 5 "laying out length."
Step No. 6 "laying out seat cut."
Step No. 7 "laying out rafter tail."
Step No. 8 "cross cutting."
Step No. 9 "laying out, using pattern (using first rafter as pattern)."
Step No. 10 "cross cutting" (balance of rafters).
Step No. 11 "placing and erecting."
Step No. 12 "face and toe nailing."

The jobs specified are so interrelated that some of them cannot be completed until work has been done on some of the other jobs. For example: Steps Nos. 11 and 12 listed above cannot be performed until the ridge board is made. In the same manner the completion of the steps in making and placing the ridge board cannot be finished independently from the rafters.

Upon the completion of this entry and check, the lower left hand part of the chart indicates at a glance all of the basic operations involved in the jobs listed in the unit course and shows the order in which these operations are involved. In scrutinizing the operations which are so checked, the results of such scrutiny are entered in the column headed new processes. In the first job both operations are listed in the new process column. Going down to the second job, it is noticed that all operations are new except operation number one. They are all, therefore, listed in the new process column. Going to job number three, it is noticed that all operations involved in this job have been performed in the two preceding jobs. Going to the fourth job, the third and ninth operations in this job are new. In the fifth job listed, all the operations involved have been performed in the preceding four. It is recognized, of course, that the new situations and the new things in a job, because of the construction involved, must be recognized even though the construction itself is simply a new combination of operations already learned. The same basic operations may be performed in a new job under new conditions and in new combinations, which facts alone would make the new job a desirable teaching job. After listing the entries in the new process column, the teacher can make his decision relative to changes from the constructional to an instructional order due to the fact that the individual going through the jobs is a learner. It has been previously mentioned that the second and third jobs interlock. In teaching the unit course in hip roof framing, it is probable that the job listed as the third would be taught second, and

the job which is listed as the second would be taught third. This, of course, would modify the entries in the new process column. Changes such as the one just described would be made in order to prevent the introduction of too large portions of new work at a time.

It will now be readily observed that this checking of basic operations for each project in the course will automatically show to just what extent the course will give a pupil experience in the basic operations. A unit course must offer projects which will check every basic operation in that unit at least once.

The material entered in the illustration column will be such material of an illustrative nature as is necessary for the proper teaching of the jobs lisfed. The material in this column may be working drawings, perspective sketches, sections, photographs, or any other material which best serves as an aid to the learner. When possible and expedient it is well to have some of this illustrative material typical of the drawings or layouts which the individual will meet should he do the jobs in the trade which he is taking in the course.

In the entering of related material it is probable that a division into technical and occupational will be convenient. The material entered in the technical column is the related information tabulated under condensed headings which must be known in order to perform the jobs listed in an intelligent manner. This technical information may be listed by jobs or by kinds of information. If the technical information is listed by jobs there is likely to be considerable repetition. If it is listed by kinds of information, namely, mathematics, science, materials, trade terms, tools, etc., it is still accessible and at the same time has the repetition eliminated.

The related information in the occupational column is that which, while not absolutely necessary to secure the proper performance of the jobs in the course, still is of decided value from the standpoint of enabling the learner to understand the occupational situations in the jobs which are found in the United States today. This occupational information column is condensed, and is strongly supported and supplemented with the classifications above basic operations in the chart.

The last check on the list of jobs entered in the job specification column is to indicate in some way those parts and places in the classifications above basic operations actively represented in the course. For instance, in making this last check it will be necessary to use the upper part of chart No. 2 in checking the jobs in Figure 4. Figure 4 could be placed on top of the lower part of Figure 2. By circling divisions in the upper part of Figure 2 the last checking could be made. Beginning at the top, a circle could be placed around the following classifications, to show clearly what parts are actively represented by the courses listed. In *personal field of the carpenter trade* a circle would be placed around *apprentice, journeyman, job foreman.* In *major carpenter trades* circle *building construction;* in *types of buildings* under *homes* circle *bungalow* and *cottage;* under *out buildings* circle *garage;* in *divisions of building trades carpentry* circle *rough carpentry;* in *divisions of rough carpentry* circle *frame construction;* in *subdivisions of rough carpentry* under *roofs* circle *hip roof;* in *construction members* circle *common rafter, ridge board, hip rafter,* and *jack rafter.*

A sample job sheet such as would probably be used in instruction follows: (For detailed description of the relationship between the lesson plan, job sheets, and graphic aids see Industrial Arts Brochure No. 2 entitled "The Lesson Plan, Job Sheets, and Graphic Aids" published by the Bruce Publishing Company, Milwaukee, Wisconsin.)

Job Sheet No. 4.
Carpentry
Roof Framing
Paul C. Nelson

Job Specifications: To lay out a common rafter for a 1/3 pitch garage roof having a span of 12 ft.

The common rafter is the roof supporting member extending from the ridge board to the wall plate at an angle of 90°. It is one of the most common roof framing

members and the principles involved in the layout are used to a large extent in all roof layouts.

Materials: Fairly straight 2" x 4" x 8'.

Tools and Equipment: Pair of saw trestles, steel square, 3H drawing pencil.

Procedure:

(1) Place stock on saw trestles and select top edge.

The crown (convex) edge of the stock is used for top edge to counteract the tendency to sagging.

(2) Lay out top cut.

(See Job Sheet No. 2 Roof Framing.)

(3) Lay out length by stepping method.

With square in position for top cut, mark at 12 along blade to complete first step (see sketch). Slide square along edge of rafter to place 8" mark exactly where the 12" mark was located in first step, and using 12" and 8" on the square along top edge of rafter repeat marking and stepping until six steps have been marked.

(4) Lay out seat cut.

From the point marked at end of sixth step draw a plumb line and lay out seat cut as explained in Job Sheet No. 3 Roof Framing.

(5) Lay out end of rafter tail.

Measure a horizontal distance of 6" out from the plumb cut. Use 8" and 12" on the square and place it on the rafter as shown in sketch (dotted lines). Mark along tongue.

Questions:

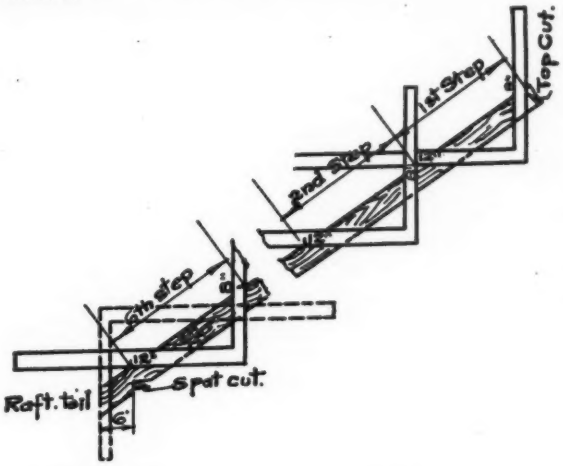
(1) Which edge of stock is used for top edge of rafter? Why?

(2) Which is the "blade" on the steel square—the "tongue"?

(3) What is meant by "Stepping Method"?

(4) How many steps would you lay out to find the length of a common rafter for a roof having 26' span?

(5) What is the total rise of the rafter described in the specifications?
(6) What is the vertical height from seat cut to top of rafter along the plumb line?
Record:



Name..... Class.....
Date begun.....Date finished.....
Have you answered all the questions?.....
Instructor's Grade.....

In making the job sheet, using the chart as an aid, the job specification is taken directly from the job specification column. (See Fig. 4. It will be remembered that Fig. 4 is a sample detailing of the lower part of chart No. 2.) In securing the material for the orientation paragraph which follows immediately under the job specifications, very frequently the upper left hand part of the chart is of direct assistance. This paragraph indicates some or all of the following kinds of information: Who does the job, where the job is necessary and appropriate, in what situations is the necessity for the job found, and what diagnosis is necessary. The purpose of this paragraph being to give the learner an understanding of the significance of the job and where it should be performed, much of the material in the upper left-hand part of the chart is of assistance in formulating this paragraph, as the chart carries such information.

The materials and tools and equipment are frequently found in the related information columns. Sometimes it is necessary for the teacher in preparing the job sheet to go into some details beyond those which are carried in the related information column or in the illustrative material column. The more important sketches and other illustrative material which are needed in making the job sheet, the orientation paragraph, or some part of the procedure will be found in the illustrative material column on the chart.

In writing the procedure in the job sheet, the steps-in-doing can be taken directly from the chart. The checking at the left of the job under the basic operations, indicates the specific things done in performing the job, and indicates also the order in which they will be done. The teacher in entering these steps-in-doing will select from the related information columns such kinds of information as are necessary under each of the steps-in-doing and will enter such information under the step where it applies. This use of the chart is of specific assistance in completing the procedure part of the job sheet. In formulating the questions appearing at the close of the job sheet, the new process column on the chart assists the teacher. Some questions should be included at the close of the job sheet to link this job with preceding jobs and some questions should be included based upon the new things done and the new information learned in this job. The new process column shows at a glance the new operations, and is of assistance where the given job is used in a given course. Sometimes a given job is used in different courses and, therefore, there is some variation in the operations which are new to the pupil. In such instances the new process column gives an indication of the probable types of questions which should be entered.

It will be evident to the reader that many of the regular pieces of work in the industrial teacher's organization of material are specifically aided in the graphic records of analysis. Whenever a pupil is under the instruction of an industrial teacher, that which is taught should be selected and handled because of skilful preparation by the teacher. Any industrial content has to be analyzed and arranged by the teacher for lesson plans and job sheets. It is necessary, also, to arrange this industrial content in such a manner for instruction so that, should the individual pupil desire to take further work in the occupation, that which he has already covered need not be repeated. The industrial work taught the pupil should also function specifically in helping vocational and educational guidance. The specific phases of these three divisions of the industrial teacher's organization of material which are aided by the charts are as follows:

Analysis and Arrangement for Lesson Plans and Job Sheets

1. Checking the order in which assignments of work are given to pupils.

2. Checking what the pupil is to do in each job and the order in which he will do this.

3. Selecting and orienting of related work.

4. Checking the projects which are included in a group for choice to indicate the basic things done in common.

5. Showing the basis for any change from trade content in shop and drawing courses.

6. Arranging the total trade content to make it easily accessible for lesson planning and job sheet making.

Further Work in the Occupation for the Individual

1. Showing clearly the fields of work open in advance of the work in the course as given to the pupil.

2. Showing the kinds and types of work not covered in pupil participation as a basis for working agreements with other schools and with the trades.

3. Showing the breadth and avenue of approach in the fields of work in occupations and occupational groups from which the course is taken.

4. Showing the divisions of work in the present trades toward making the workers specialists.

Vocational and Educational Guidance

1. Checking the planned courses to indicate how truly they are representative of what is done in the occupations.

2. Recording individual pupil progress in the form of a skeleton outline for use as an aid in vocational and educational guidance.

3. Showing pupil participation in the common mechanical activities necessary in modern life.

The School and the Community Joined by Manual Arts

Earl W. Thrall, Director Manual Arts, Beloit, Wisconsin

MODERN methods have decreed that the school is the logical community center, and that one of the important duties of any school system is to encourage, accommodate, and perhaps direct, any activity for school and community benefit.

As a rule, people seem to look upon the school as a very formal affair. "Send the boys and girls there, but keep away yourself," appears to be the attitude of far too many.

Every person connected with the public school system owes it to that community to contribute something toward bringing the school and the community together, on a friendly and active basis.

The manual arts department of any school may be of greater value in this respect, than are some of the other school departments. Manual Arts classes carry direct results of this training into the home much more quickly than the results from many other school studies are felt, or recognized. May we not use this fact to bring parents and neighbors into the school, and thus open the road to a better acquaintance and understanding, and better cooperation?

A manual arts exhibit usually brings out a crowd, but an exhibit is very often an affair to show up your best and selected results. It, somewhow, lacks the personal element. People respond in the same attitude as they do when gazing into a show window on the street. They gaze, comment, pass on, and forget. Nothing has been gained for the school, and even curiosity is limited.

The *Open House Day* or *Visitors' Day,* as conducted by manual arts departments, has seldom failed to bring both good crowds and good results. Make your exhibit as large and as good as you wish, but *have classes in every room of your department in operation all of the time.* This is the personal element. You have offered variety, and there will be something there that will appeal to each of your visitors. They will be interested enough to stop and study, comment, and perhaps question. These experiences will furnish the topic for conversation in the home between mother, father, and the son. There is something in common now. The father often relates his experiences at the shop or office and expects his family to pause, in the evening meal, and join him in his reminiscences of the day. The son in school often attempts to do the same, but fails to get response because there *is nothing in common.* His parents do not know what he is talking about. They show little interest and offer little response, and the boy in school just naturally concludes that "the old folks at home" don't think the school amounts to much. Classroom teachers, you get the result of that in your classes that very day and every day thereafter. Do you like it? Have you made any effort to solve it, or to get away from it?

We have operated this *open house system* for years, and it has always been successful. People will come again, year after year, and each time they come they learn more about the school as it is today.

Our open house day begins at noon and continues right through the evening, generally ending about eleven o'clock or even later. Pupils work in all classes all of the time. All machines are in operation all of the time, mechanical drawing classes are at their benches working on regular assignments, printing classes are performing every operation done in that class, and the presses are printing souvenir cards which are given to visitors while in that room. The card accompanying this article was used as a souvenir on one occasion. On exhibition in every room, is at least one piece of work produced by *every pupil* enrolled in that class. The work of *every* pupil must be exhibited. It is the only fair and honest way, both for students and instructor.

As soon as a visitor enters, we aim to have him greeted by some one from the department (either teacher or pupil from the department) who systematically conducts the visitor—usually in groups—through the department, and explains the aims and system of the class instruction and the shop. A good guide will not neglect to call attention to the work of the son, daughter, or neighbor's boy who works daily in some of these classes. Old friends and neighbors meet, and new acquaintances are made. Old school days are recalled, and these earlier experiences are compared with the system and equipment now before them. Parents often take friends or neighbors to see the work produced by their son. The evening passes quickly because of interesting, pleasant, and changing contacts. A community socialized evening, and classwork of the school have been united. It might well be called a "father and son" night.

Fellow manual training teachers, I appeal to you to give it a trial this year. Your department owes it to the community. Lead out and do it. If you can get

the old schoolhouse pried open to something that the community will respond to, you will break that old shell known as "formality." Many people, both old and young, look upon the school as a sort of a prison where young people are confined under a set code of rules and forced to study and perform certain duties while of school age. School administrators and classroom teachers have developed this idea and this attitude. They have never allowed anything to enter that door except compulsory requirements and steady grind of assigned lessons. Pleasure and social life are no sin. "All work and no play" is equally as bad as "All play and no work." Think it over.

The education of the child is the job of neither the parents alone, nor the teachers alone." Both must help and pull together.

Let us all be sure we have contributed something toward uniting the home and the school.

BE A BOOSTER[1]

Boost your city, boost your friend;
Boost the church that you attend.
Boost the street on which you dwell,
Boost the goods that you sell.
Boost the people 'round about you,
They can get along without you,
But success will quicker find them
If they know that you're behind them.
Boost for every forward movement;
Boost for every new improvement.
Boost the man for whom you labor,
Boost the stranger and the neighbor.
Boost the ones whom you employ
Whether man, or girl, or boy.
Cease to be a chronic knocker.
Cease to be a progress-blocker.
If you'd make your school and city better,
Boost them to the final letter.

[1]These verses have been used by the Beloit high school as a means of promoting local good will. A considerable number on colored stock were printed in the school shop.

Britannia Metal — IX

A Review

Professor William H. Varnum, University of Wisconsin.

WHILE the project method of presentation in these articles may seem arbitrary, one familiar with teaching art metal soon realizes that certain problems seem to be especially adapted to the logical development of specific technical processes. For example, the low plate is an excellent vehicle for the beating down process, as is the low bowl for elementary raising.

To avoid a dogmatic outline, it should be understood that each problem of the series has a number of variations capable of being used to advantage. The present article is intended to suggest a few of the many possible combinations made by the writer's students from 18 gauge Number 1 *Britannia*.

Figure 1 illustrates a hollow-handled cream pitcher similar to the problem of Article 2, but constructed with a bead or reed decorative reinforcement around the rim of half-round Britannia wire, applied by cramps as explained in Article 5, Plate 2, Figure 10. The finish is dull, produced by fine emery cloth lubricated with oil and used with a circular motion.

ILL. 1. BRITANNIA CREAM PITCHER.

Figure 2 consists of a set of cider or lemonade beakers of Dutch pattern. The body is shaped into a cylindrical form (an adaptation of Article 2) wired as in Figure 1, Plate 1; the solder snippets placed in the interior and along the joint, followed by the application of a small bunsen flame to the outside of the cylinder.

ILL. 2. SET OF BEAKERS.

After reshaping on a cylindrical mandrel or shaft, secure the bottom plate in position (Figure 2) and to avoid opening previous joints, bind wire around the cylinder. After soldering, trim off the excess metal with the jeweler's snips and file flush.

The foot or base may be cast and turned as in Article 7 or beaten. In developing the latter process, form a ring of the desired height; Figure 3, Plate 1, making a snug fit with the beaker base. Flare out by beating down with the round end of a horn hammer, working from the inside of the ring on a hard wood block correctly shaped with gouge, files, and sandpaper; Figure 4, Plate 1. Rotating the ring clock-wise, shape with fairly light strokes overlapping each other, starting

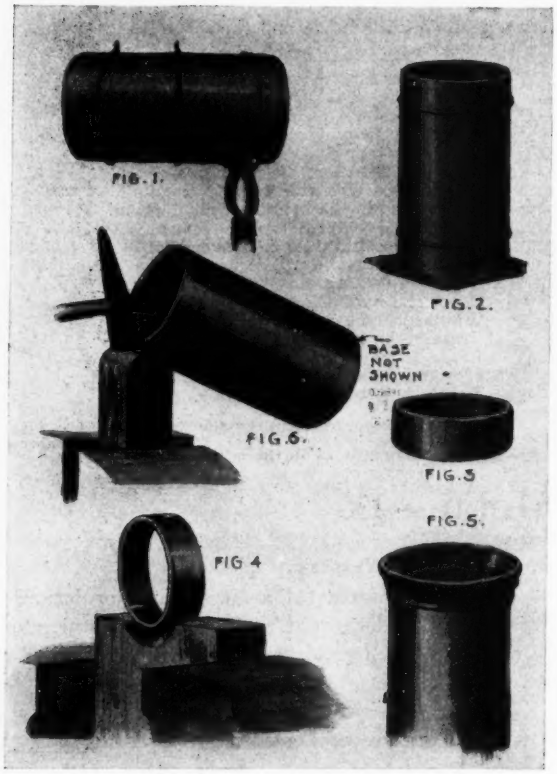


PLATE 1. THE BEAKER.

at the beginning of the expansion and progressing in a spiral series toward the outer rim.

It will take two or three repetitions of this process before the full curve is secured. Work gradually as haste in stretching generally results in splitting the metal.

After shaping, apply the foot to the beaker body and solder as in Figure 5, taking the precaution to wire securely in position. The problem is completed by giving an outward flare to the top, following the method of Figure 6, rotating the beaker clock-wise and working slowly in a spiral pathway toward the rim which may be further strengthened by reeding.

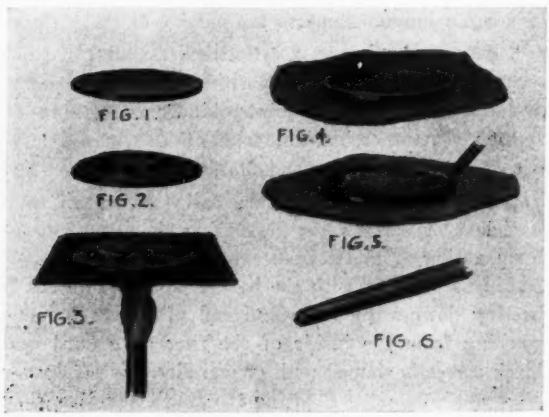


PLATE 2. ENAMELLING.

An attractive dull finish may be secured by fine emery cloth and oil, followed by powdered pumice and mater. To give a brilliant polish to the interior, use a small round felt buff and tripoli for the sides and a flat felt bottoming or case buff for the inside base.

Low plates of the type shown in Figure 3 are developed by variations of the technic of Article 5. Surface enrichment and color has been supplied by small medallions of either transparent or opaque enamel. A small circle of 18 gauge copper is domed slightly as Figures 1 and 2, Plate 2, cleaned with nitric acid and on its crowning side covered with an appropriately harmonious enamel which has been ground under water in an agate mortar to the consistency of salt. Care should be taken to wash clear enamel free from all milky substances. A fuller treatment of the enameling process will be found in many current art metal texts.

Resting the medallion on a wire screen, fire to a smooth surface over a bunsen flame, at first applying the heat slowly to drive off water and its ultimate steam.

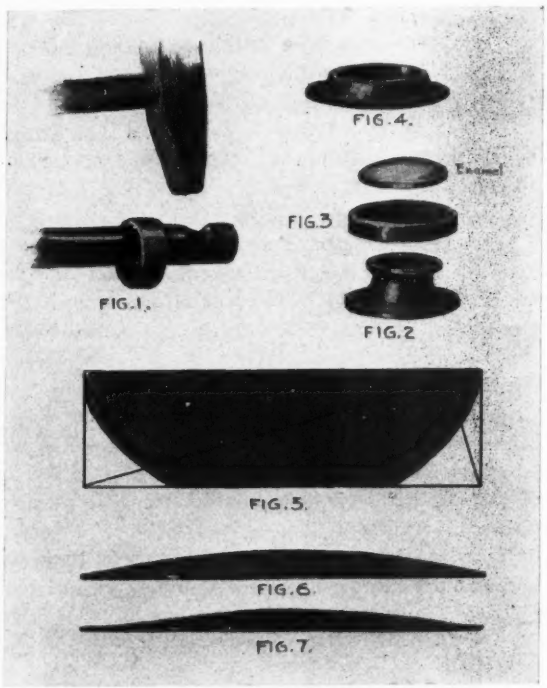
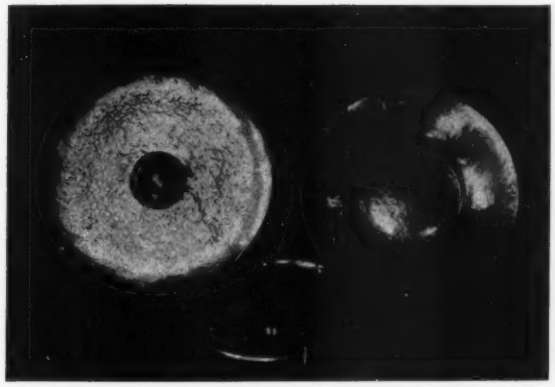


PLATE 3. DETAILS OF LOW BOWL.

To mount the enamel disc, form a ring or bezel of Britannia making a loose fit around the disc and sufficiently high to press over the medallion top one sixteenth of an inch.

File the top edge thin to facilitate the pressing process, and solder as in Figure 1, Plate 2. Insert the medallion and with a slightly rounded steel tool of Figure 6, chase or burnish the Britannia gently over the disc. Figure 5 of Plate 2 shows this process which may be completed by polishing the bezel with tripoli and a 1¼" crevice felt buff.



ILL. 3. BEATEN PLATES.

The raising process of Article 4 and the cover technic of Article 2 are combined in the bowls of Figure 4. For color enrichment, small discs of enamel may be set in the knob tops. As enamelling of these discs has been briefly explained, it is only necessary to comment on cover and knobs.

The simpler knobs or handle Figure 4 are described sufficiently in Article 3. The example in the lower left corner of the illustration is made in two parts. A round ring of sufficient height is hammered over a grooved steel mandral, Figure 1, Plate 3, until the correct curvature is attained, afterwards filing to correct the edges. Upon this, a small circular box of Figure 3, forming a bezel for the enamel is soldered in place.

The medallion is then dropped into position and the edges of the bezel burnished until the enamel is secure. This problem affords an excellent opportunity to learn the use and value of commercial burnishers. An attractive variation for setting the disc is seen in the right-hand bowl of Figure 4, with its retainer detailed in Plate 3, shaped from a cylindrical ring.

Difficulty may be experienced in shaping the lids, hence attention is directed to Figures 6 and 7. If the lid is shaped or raised like Figure 6 over a mushroom stake, planished and placed on a surface plate, we may use the round end of a modern mallet and with a light stroke directed near the circumference, soon get the desired reverse curve of Figure 7.

ILL. 5. A BRASS AND PEWTER LIGHTING FIXTURE SHOWING WILLIAM AND MARY INFLUENCE.
(Courtesy of Kantack, Heath & Warman, New York City.)

As an aid to designing low bowls, Figure 5 shows the designer's enclosing rectangle of a desired ratio. The Whirling Square or Root 5 rectangles form good enclosing forms. Point x is determined by drawing a diagonal of the enclosing area, and constructing a line from the right lower corner at right angles to the diagonal. If a horizontal line be drawn through x cutting the short ends of the enclosing rectangle, very desirable turning points for the bowl are located, in good design relationship to the height of the bowl.

ILL. 4. LOW RAISED BOWLS.

READY FOR THE PARADE. CIRCUS TOYS MADE BY PUPILS OF MR. F. H. WILLIAMS.

A Type Project for the Sixth Grade

H. Clay Houchens, Richmond, Va.

ONE of the most perplexing as well as one of the most interesting observations in the study of industrial-arts teaching as it is practiced in this country is the variety of approaches and the numerous aims or objectives. In fact, this country has for many years been a laboratory for the trying out of values. At no period in its history has the problem been content to remain for any considerable length of time in a state of self-satisfied complacency.

This disposition on the part of teachers of industrial arts is very largely responsible not only for the enrichment and growth of this particular phase of education, but also for real contributions which the work has made to education in general. Industrial-arts teaching has done much to make the aims of education more social; it has demonstrated importance of participation over mere intellectual recapitulation as a method of education, and has proven that some of the richest and most valuable materials of education are to be found in the study of contemporary life.

The use of the *project* as a unit of instruction had its beginning in this phase of education and while its use has become somewhat familiar to teachers of practically every subject, it is reasonable to believe that future study and experiment will reveal possibilities which at this time are unknown. So far as possible, all teachers should have the benefit of each experiment, for it is from the exchange of ideas and the results obtained from the working out of these ideas that the inherent possibilities of the project as a unit of instruction will accomplish the greatest good.

The teacher of industrial arts often finds it difficult to select projects which are suitable to the purposes of his work and which are at the same time of sufficient interest to the boy. This is especially true of teachers who still continue to emphasize tool processes or the development of manipulative skill rather than the larger values of the work. With them the worth of a project is judged by how well it lends itself to a logical arrangement of tool processes. To a teacher who can see and appreciate no greater value in industrial arts than the development of manipulative skill, a project of the type here illustrated should not be attempted. It is far better that he continue with the conventional "models" which are so admirably suited to his purpose. It has not yet been proven that such teaching is actually harmful to the proper development of children, and, until that has been done or until there is a greater demand for a justification of such work in terms of real worth, there is little that can be done to better the situation. It is, however, encouraging to note that the number of such teachers is growing less each year.

Teachers who refuse to over-emphasize the development of manipulative skill in the teaching of industrial arts are sometimes accused of ignoring the importance of form and construction in craftsmanship. Where such an accusation is justifiable, the results of the teaching must of necessity be of a low order. A teacher cannot ignore these things and at the same time realize the larger values of the work. The teaching of form and the development of a reasonable degree of manipulative skill is absolutely necessary to good teaching in these grades.

It is not, therefore, a question as to whether or not we should insist upon good form and execution in the work of our pupils. The important question is how we can best make use of these things in the attainment of larger educational values. The economic, recreational, health, esthetic, prevocational and social values of the subject rather than a logical progression of tool processes should form the basis of our courses of study.

The educational worth of any industrial-arts project should be measured in terms of its contribution to one or more of these aims. Where courses of study are based upon these values, the selection of projects takes on quite a different meaning.

Projects should be selected not only on the basis of the objectives or aims of the work, but also with an appreciation of the part played by the fundamental impulses to expression or action in the education of the child. Not a little of the just criticism directed at industrial arts as the subject is often taught is due to the failure of teachers to recognize and to properly direct the impulsive tendencies of children.

The wise teacher selects his projects with a full recognition of the importance of these fundamental impulses and utilizes them in the formation of desirable habits and in the development of proper attitudes and appreciations. The teacher, on the other hand, who selects his projects without considering them—the impulse to manipulative activity, the impulse to investigate, the art impulse, the social impulse, the impulse to play—reckons without his host and is likely to wonder why the children are not more interested. There is infinitely more good to be derived from projects selected on the basis of the impulsive tendencies than upon any progression of tool processes, however logical.

When a teacher of industrial arts once appreciates and properly estimates the larger values inherent in his subject and learns to utilize the fundamental impulses and interests in his teaching, the selection of suitable projects will be a fairly simple matter. It is for the purpose of directing thought along these lines that this project of a miniature circus is submitted.

This project, which is one of several type projects of our sixth grade, was recently completed by a sixth-grade class under the instruction of Mr. F. H. Williams. Mr. Williams, who is a pattern maker by trade, entered the teaching field one year ago with no previous professional training. Aside from other considerations in connection with this particular project, the results obtained by an inexperienced teacher should be of interest to supervisors who find it necessary to train teachers after entering service.

The project was suggested, planned, constructed, and decorated entirely by the boys. Construction of all details was well thought out and done in a workmanlike manner. The complete circus consists of the following pieces:

1 Tent.
12 Freight wagons with drivers.
2 Cages with drivers and animals.
1 Chariot and queen.
1 Ticket wagon with driver.
1 Clown and jumper.
2 Elephants.
1 Band wagon with musicians and driver.
1 Steam Caliope with driver.

The expressions of interest and pride on the faces of the boys in the photograph is only a slight reflection of their attitude from the time the project was begun until its completion. The enthusiasm of the boys became contagious and hardly a day passed that a number of their parents and friends were not in the shop as interested observers of the work. The circus is at this time being displayed in the window of our largest department store and is attracting much attention.

The danger of permitting this type of project to degenerate into aimless puttering is fully recognized. Thoughtful organization of what is to be taught, based upon clearly defined aims or objectives, is absolutely necessary for success. Following is a skeleton outline which was prepared from an analysis of the project. From this skeleton outline detailed lesson plans were prepared from time to time as the work progressed.

THE BOYS AND THE CIRCUS TOYS WHICH THEY MADE.

ANALYSIS OF PROJECT FOR DETERMINING WHAT IS TO BE TAUGHT

Grade—6B School—Highland Park
Time Allottment—60 Minutes per Week.
Description of Project—A complete miniature circus; scale approximately 1″=1′-0″
Date Begun—Nov. 2, 1923 Date Completed————

Structural and Decorative Design.
- Determining approximate size of the various units.
- Determining appropriate construction to be used.
- Making sketches and templates for curved parts.
- Making designs for stencils.
- Selecting appropriate colors.

Technical Processes.
- Making the necessary sketches.
- Making templates.
- Making out stock bill and preparing specifications.
- Getting out stock.
- Reducing stock to required dimensions.
- Cutting curves.
- Sandpapering.
- Laying out parts for assembling.
- Boring.
- Chamfering.
- Fastening with glue and brads.
- Fitting and hinging small doors.
- Putting in glass.
- Fastening with screws.
- Mixing paints.
- Finishing with paint.
- Stenciling.

Tools.
- Saws—cross-cut, rip, coping, back, turning.
- Square.
- Jack plane.
- Knife.
- Chisels.
- Marking Gauge.
- Brace and bits.
- Spokeshave.
- File.
- Hammer.
- Screwdriver.
- Sandpaper.
- Nailset.
- Glass cutter.
- Brushes.

Stock and Materials.
- Lumber—pine, poplar, basswood.
- Screws—form, size, material.
- Finishing materials—paints, varnishes, oils, etc.
- Glass.

Social and Industrial Phases.
- Location of the chief lumber industries.
- How the lumber industries are carried on.
- Chief lumber markets and why.
- The woodworking industries of Richmond.
- Richmonds' furniture manufacturing plants.
- Richmond's millworking establishments.
- Richmond's turning and woodenware works (largest in the world).
- Richmond's lumber yards.
- Richmond's wagon manufacturing plants.
- Miscellaneous and allied industries of Richmond.
- The woodworker—The various occupations of the industry; remuneration, opportunities for advancement; dangers to which workers are exposed; organization of the workers.
- The circus—its origin; its growth; the circus as an organization; the probable future of the circus.

It is obviously impossible to determine at the beginning of this type of project to what extent any one of the topics can be treated. For this reason it is well for the teacher to make this preliminary outline as full and as comprehensive as possible. As the ultimate purpose of such an outline is its use in the preparation of subsequent detailed lesson plans, it will serve its purpose much better if it is over full than if an attempt was made to limit its content. Upon the completion of the project the detailed lesson plans will constitute an accurate record of what has actually been taught and will prove a valuable aid in the preparation of outlines and lesson plans for other projects of the same type.

Mechanical Drawing for Evening Schools

Norman L. Schneider, Arsenal Technical School, Indianapolis,

WE encounter difficulties in attempting to formulate a course of problems in mechanical drawing for an evening school class. In fact such a course cannot be worked out satisfactorily because the class as a rule consists of machinists, sheet-metal workers, draftsmen, and many other types. Even though the class were composed of all machinists or any other trade, the variation of knowledge, experience, and age would be such that a course of problems worked out for them would be very inadequate.

There is an individual need for each student. Each requires something which will help him in his daily employment. If he has worked at his trade for a long time, he doesn't wish to repeat what he has already learned from experience. He wants advanced work which will enable him to step higher in his trade. He may be familiar with simple lay-outs and their construction and requires more work along the line of his daily task.

Thus we see that, instead of working out a course of problems, the teacher should have a large number at his disposal so that he can select from them the problems suitable to the particular need of each student.

Sometimes another difficulty arises: The student in "shopwork" may be quite advanced but, when it comes to drawing, he probably knows very little. It then becomes necessary to teach drawing, or enough of it, that he can execute the drawing with a reasonable degree of intelligence.

Many of the students, in fact the majority, who attend evening school classes of mechanical drawing, come for blue print reading. They are not nearly so much interested in making a mechanical drawing as they are to be able to read or interpret one. Their work consists of taking ideas conveyed in the blue print and working them out in metal or any material they are using. Naturally, their interest lies in interpretation rather than execution.

Mechanical drawing for a machinist should consist of little drawing, just enough in fact to familiarize him with the rudiments. He should have as much blue print reading as he can master in the allotted time. Of course, if the student has had no drawing experience, then it becomes necessary to start at the beginning, taking different kinds of lines and uses of instruments. Common block drawing should be taught first then hidden and angle lines, circles, tangents, and so on.

After the different lines and instruments are taught, blue print reading may be stressed to advantage. This should consist chiefly of giving the student several finished blue prints, not too difficult, allowing him to pick out any part of the drawing and to explain just what it is and how it would look in the finished piece. If he can do this, he really understands blue print reading; thus his power of visualization is strengthened and soon he can look at a blue print and see the finished project.

The best way to read a blue print intelligently is to be able to make one. Surely, if a student is able to convey his ideas on paper, he can interpret those of someone else when he sees them on a blue print. The best plan, combining these two methods, is to give the learner an unfinished drawing and allow him to complete it. To obtain the best results, the drawing must contain all the data necessary.

From experience I have found that I get the best results in evening schools by this method. Give the students a blue print with two complete views. Allow them to study it until they can understand all the ideas conveyed by the print. Then tack the print on the board with a piece of paper where the third view should be and let them draw it. This means, if the drawing is an end view, that the student should project all vertical dimensions from the front view and have only the horizontal dimensions to measure.

The above method does two things for the student. It makes him think he is getting the most good possible from the course and keeps him attending the class. So many drop out because they feel they must do too much unnecessary work. The great problem of any evening school class is regular attendance. Unless the men are intensely interested, and their interest is kept up by work that appeals to them and makes them feel they are progressing, they will soon drop out.

Some of the problems given should be incomplete, allowing the pupil to draw up the entire two or three views and complete them in every detail. One more important point should be mentioned. The drawing teacher should have the pupil progress as quickly as possible to the stage of the shop work, whether machinist or draftsmen, so that the problems given will have a direct relation to his daily work. The student should be encouraged to bring his blue print from the shop, or a sketch of it and draw it up in class.

Drawing for the sheet-metal worker should be handled in an entirely different manner. For this class of students a special course can be worked out. It is necessary for all to thoroughly understand each of the forms of development if they are to be successful in their trade.

The essential problem for these pupils is to be able to make or lay out the problem on paper as they would in metal. For the beginner the course should consist of elementary problems involving the different kinds of lines and instruments. Much time should be spent on purely projection problems. The sheet metal worker will see the advantage of this, as projection is the basis of all developmental work.

Developments proper should be divided into three distinct divisions, parallel, radial, and triangulation. In parallel development, only straight parallel-sided objects should be considered until the principles of a development or ("stretch-out" as the sheet-metal worker would probably consider it) is understood.

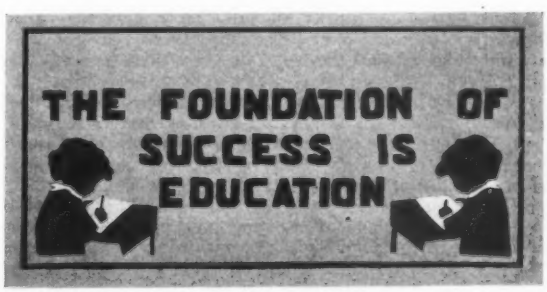
Radial development may be taken up next. A problem, such as a wedge, is very good to bridge the gap between parallel and radial development. It is a good plan to start radial development with straight-sided objects as pyramids, then circular objects as these come afterward. When the principles of both are understood, triangulation may be taken up. It is well to spend plenty of time on each division so that it is thoroughly understood. Intersections logically follow this.

The remaining time may be spent in working out problems in parallel, radial, and triangulation or any combination of the three ranging in difficulty as the pupil progresses. There is no limit to which mechanical drawing may be carried in sheet metal work.

Practical problems should be used wherever possible. The student should bring to class the problem he is working on in the sheet metal shop and work them out in class, thereby receiving direct benefit from his evening-school work.

These two classes—the sheet-metal worker and the machinist—will be sufficient to illustrate how mechanical drawing should be taught in a night school class. The one spends little time in drawing and much in blue print reading; the other devotes all his time to drawing.

From what has been said it will be noted that all the work must be individual instruction, since all the drawing relates to the learner's daily work. Very seldom will two students be working on the same problem since they vary in ability, education, attendance and experience. Even though they start together in a short time they will be far apart in their work. Since instruction is practically individual, the size of the class must necessarily be small if effective work is to be carried on. The individual attention necessary establishes fifteen as a maximum class; twelve is more conducive to real study and benefit.

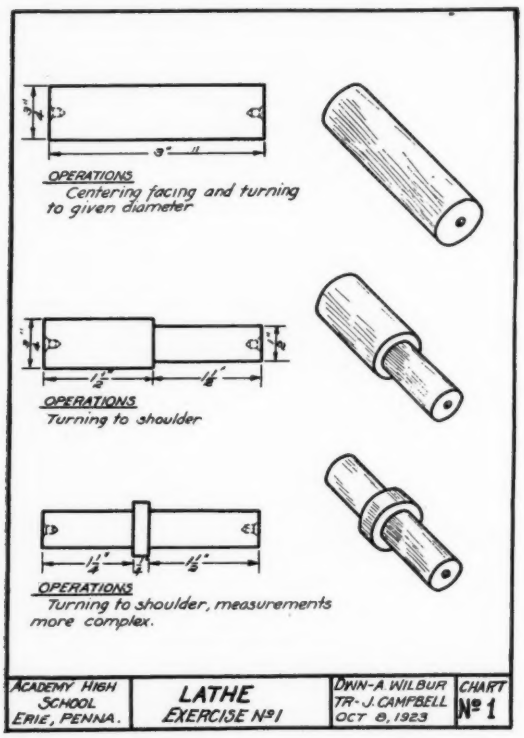


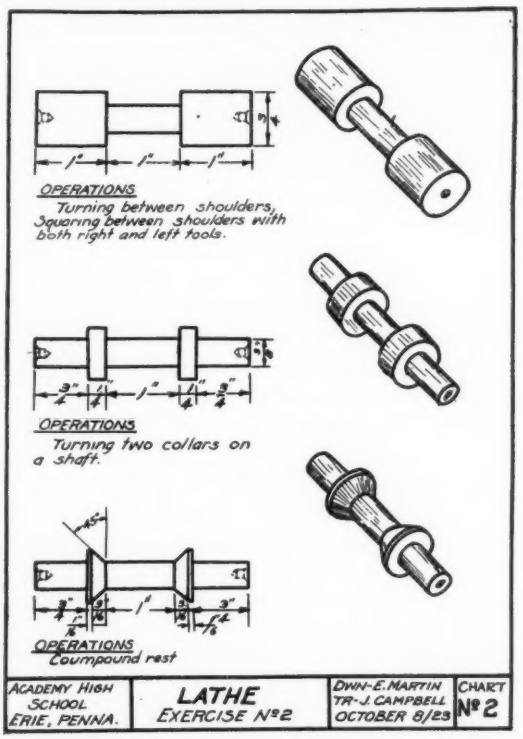
POSTER MADE BY GRADE CHILD, SPRINGFIELD, MASS.

Correlation of Mechanical Drafting and Machine-Shop Work

John F. Faber and Edwin Youngbluth, Erie, Penna.

Much has been, and is being said, about correlation of the school drafting room and shops. This subject has been a topic of discussion since the introduction of shop work in our school systems. These discussions have resulted in many suggestions, but as yet the problem remains unsolved. The shop instructor cannot advantageously rearrange his course of study to fit that of the drafting instructor, nor can the drafting instructor conform to this procedure. Both, however, are eager to cooperate for the welfare of the student, and this desire has resulted in various forms of correlation.




OPERATIONS
Turning between shoulders, Squaring between shoulders with both right and left tools.
OPERATIONS
Turning two collars on a shaft.
OPERATIONS
Compound rest
ACADEMY HIGH SCHOOL ERIE, PENNA.
LATHE EXERCISE Nº2
DWN-E. MARTIN TR-J. CAMPBELL OCTOBER 8/23
CHART Nº 2

It is common to have an enthusiastic young shop instructor appear in the drafting department the first few weeks of school, armed with an assortment of blueprints and magazine cuts and offer the following, "I am a thorough believer in cooperation of departments. You might have my class (first year boys) draw and blueprint these problems for shop use. They will know then what to expect in the shop. This makes excellent correlation." To a certain degree this is correlation, for the shop is being furnished with material from which to work, but is it correlation as far as teaching is concerned? The greater part of these particular shop instructors are sincere, but have not had the teaching experience in drafting that will enable them to realize the best procedure. A few wish a set of blueprints of standard size for shop use and drape their requests in the garb of correlation. Is it not true that these teachers stress cooperation more than correlation? To be correlation in its fullest sense it must aid in the efficient teaching of both subjects.

Many shop instructors contend that the students should make drawings of the problems upon which they are to work in the shop a week or two later. This scheme is justified if it were at all possible from a pedagogical or practical standpoint. It fails in both respects, for the shop usually starts work on projects too difficult to be rendered *intelligently* in orthographic projection by the same students, if they have not studied mechanical drafting. True, the students can be made to turn out copies of plates submitted to them, but this reproduction process is not teaching the language of industry—thus, its lack of pedagogy. From a practical standpoint, the average mechanic in industry works from blue prints submitted to him. These prints are made by others, not by himself. To make the school shop training of the most possible value, it would appear that the student also should work from drawings made by others.

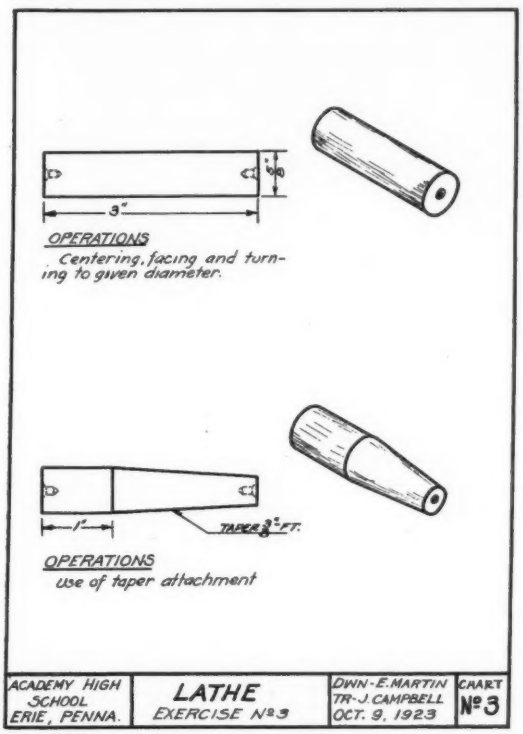
The beginner in a shop is hindered in his progress if he has not mastered the fundamentals of orthographic projection. He cannot work from a shop drawing and requires considerable individual instruction from the instructor. Unless our courses of study are well organized, he gropes blindly in the dark until the light dawns upon him through contact with the drafting department and the evolution of machine work from shop drawings. Thus, the student gradually acquires the ability to interpret drawings through his own imagination and after patient work on the part of the instructors. This is usually a slow process which is an important item in our modern schools. The output per student is greatly lessened, and it would not be overdrawing the picture to say that some of the students might have idled away much time because the shop instructor could not give the necessary individual attention.

A scheme of correlation to overcome the inability of the students to interpret working drawings and to place the machine shop on a running basis the first week of school was developed in the authors' classes and has proved satisfactory. It is illustrated by charts 1, 2, 3 and 4. The different steps necessary to teach the operation of the machine are shown by an orthographic view coupled with a pictorial representation on its right. A series of exer-

cises for the milling machine, shaper, lathe and drill press have been made which makes it possible to start work on these machines as soon as the class is organized, with group or individual instruction. The exercises shown are used in teaching various operations on the lathe and are self-explanatory.

The dimensions for these exercises were made small to allow the use of scrap stock (machine steel) which can be purchased at a low cost.

This scheme allows the student to proceed in the shop for the first few weeks without the ability to interpret working drawings, increases production, stimulates interest, simplifies the work of the shop instructor, and



gives the drafting department ample opportunity to drill upon orthographic projection and the reading of drawings, through an intensive short unit course.

This intensive short unit course consists of freehand orthographic sketching from machine parts and pictorial representations. Fifteen to twenty minutes each week are devoted to freehand lettering. The objects chosen for this work represents the kind and nature of practical machine shop problems which in all probability will be, chosen for this work represent the kind and nature of practical machine shop problems which, in all probability, will be chosen by the machine shop instructor in his shop work a few weeks later. It is not necessary, however, to sketch the same objects as the shop will use later. A number of these practical shop problems are shown on chart 5. The first three objects are made of wood, being used for simple objects to introduce the subject of orthographic projection.

Assuming that the drafting class meets twice a week for two hours a session for the first four weeks, the following outline in mechanical drafting is suggested to bring about the results mentioned.

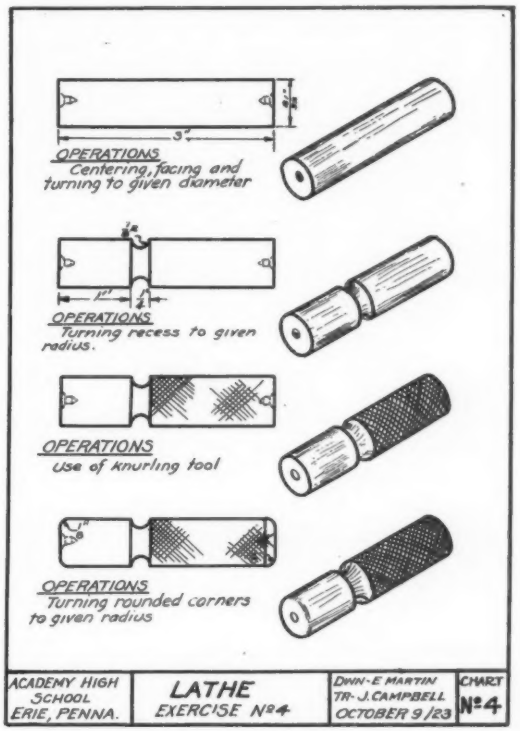
Freehand Orthographic Sketching

Lesson 1.
Brief discussion of the importance of drafting to the machinist; perspective versus orthographic projection; placement or relation of views.
Use as problem for sketching: P-1.
Note: Do not dimension.

Lesson 2.
Review placement or relation of orthographic views.
Teach the projection of irregular outlined objects and those having oblique edges.
Use as problem for sketching: P-2-3.
Note: Do not dimension.

Lesson 3.
Review placement or relation of views.
Teach the projection of objects having invisible edges.
Use as problems for sketching: P-4-5.
Note: Do not dimension.

Lesson 4.
Review lesson 3.
Teach the projection of objects having curved outlines.
Use as problems for sketching: P-6-7-8 or 9.



Note: Do not dimension.

Lesson 5.
Review lesson 4 and placement of views.
Teach projection of objects having tangents, such as link, etc.
Use as problem for sketching: P-10-11-12.
Note: Do not dimension.

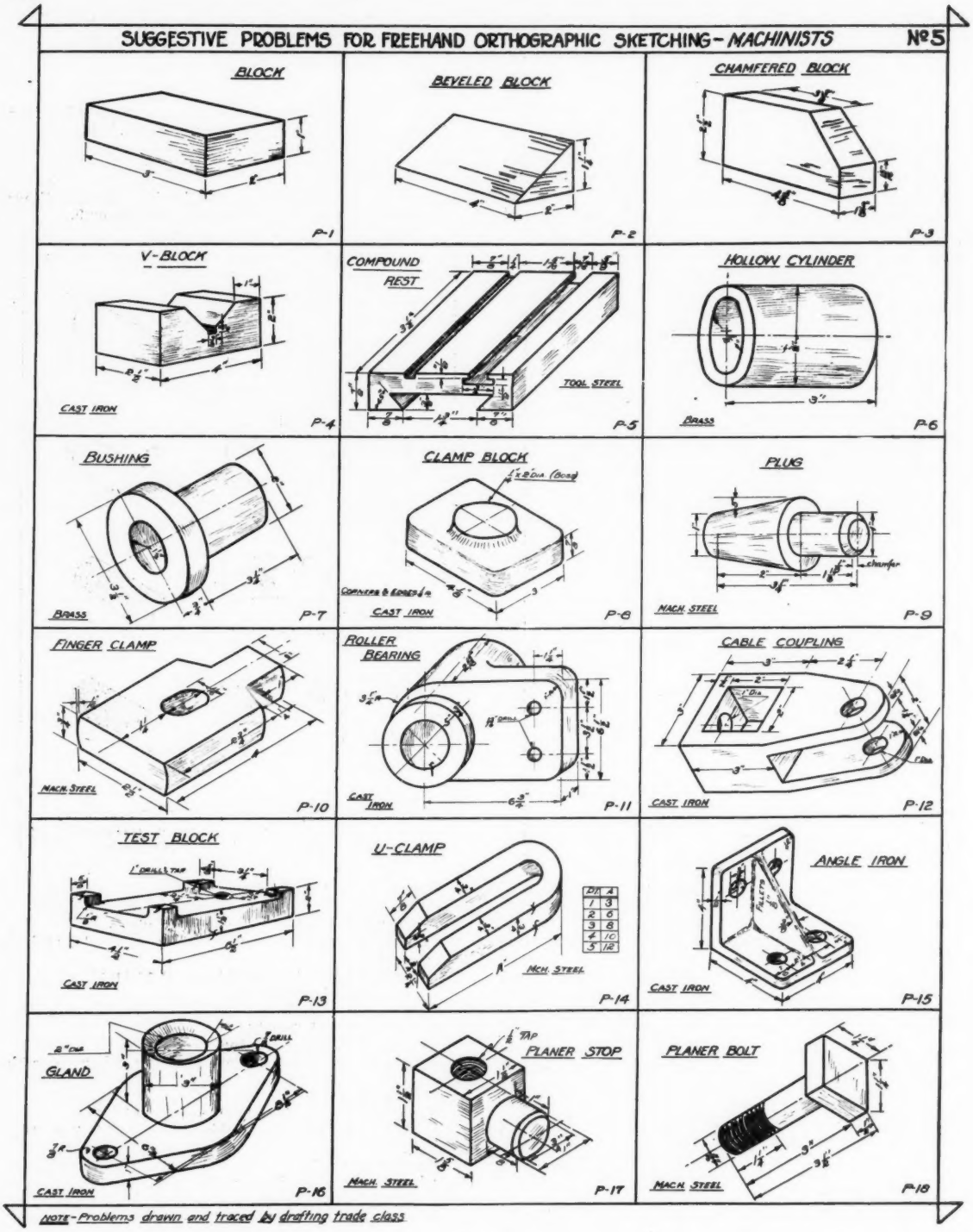
Lesson 6.
Review all work taught.
Teach proper dimensioning.
Dimension as many sketches already made as possible.

Lesson 7.
Review lesson 8.
Teach the terms "finish all over" and "f".
Sketch and dimension problems: P-13-14-15 or 16.

Lesson 8.
Review lesson 7.
Discuss the terms bore, drill, ream, tap.
Sketch and dimension problems: P-17-18.

The above outline for machine shop and drafting departments covers the first four weeks' work. After this, the pictorial assistance to the student of reading shop drawings is taken away. By this time the drafting course should enable the new student to understand orthographic projection well enough to interpret any simple machine shop drawing. The shop work is put on a production basis as soon as possible, usually making projects for school use.

The drawings for shop use, after the first few weeks, are made by another class such as a trade drafting class,



a second or third-year drafting class. This leaves the interpreting of the blueprint entirely to the student in the shop, which is similar to commercial shop practice. The machine shop class in drafting follows the regular "First Year High School Drafting" as published in the INDUSTRIAL-ARTS MAGAZINE, January 1923, after the first short unit.

This method of correlation is used in connection with our pattern and drafting rooms with the exception that the shop instructor places his pictorial representations on the blackboard for the first few weeks. This is possible, for all students begin work on the same pattern; in the machine shop the class is divided into groups, each group working on a different exercise.

Through this scheme of correlation between the drafting room and shop, boys have been taught to really interpret and work from commercial shop drawings in a short time, which is a good test of its worth.

VIEWS OF THE AUTOMOTIVE DEPARTMENTS, SIOUX CITY HIGH SCHOOL, SIOUX CITY, IA.

1. General view of the machine shop and general repair room.
2. One end of the "dead engine" room where work on rear axles and springs is carried on.
3. Another view of the "dead engine" room showing the row of engines on repair stands, the general work bench in the middle. There is another row of engines on the right side of the bench.
4. The live engine and electrical repair shop. Four live engines are mounted at the rear of this room for testing and experiment work. The benches in the foreground are intended for electrical repair and experimental work.

Auto Mechanics in the High School Development at Sioux City

Lewis H. Wood, Sioux City, Iowa

Several years ago the writer became convinced that the study of the automobile or auto-mechanics as the course is usually called, had a very definite place in the average high school. After some discussion with the superintendent and the board of education it was agreed that, if a teacher could be found, the board would spend about $50 for tools and allow the work to be tried out for a year.

After some search a manual training teacher was found who had considerable garage experience and who had taught a class or two in auto mechanics in another city. A few hand tools and vises were purchased, a dark corner under the school auditorium was cleaned out and fenced off with heavy wire fencing, and we were ready to start.

The course had been announced in the spring just before school closed so that, when work started in the fall, more boys were on hand than we could accommodate. With nothing to build on, and not knowing exactly what we were going to do, the rule of "first come first served" was observed, and the registration was held down to the figure we had agreed upon as a maximum. At the middle of the year fully three-fourths of the boys registered again for the second semester, and at least as many more wanted to get into the classes.

The space selected, while entirely without windows, was well ventilated, lighted by electricity, and best of all opened into a good driveway leading out of the building. In size it measured 18′ x 35′ so that we could get three cars inside our fence and still have room for a couple of benches and the boys.

Our first teacher besides was a good mechanic, a teacher, and a hustler. Without equipment, without a course, without anything to go by and at times without cars to work on, he still "put the work across" with such success that a larger, better room and adequate equipment became a necessity. The board and the superintendent, having followed the work rather closely, were convinced that it was desirable and so the necessary purchases and alterations were made during the summer of 1921.

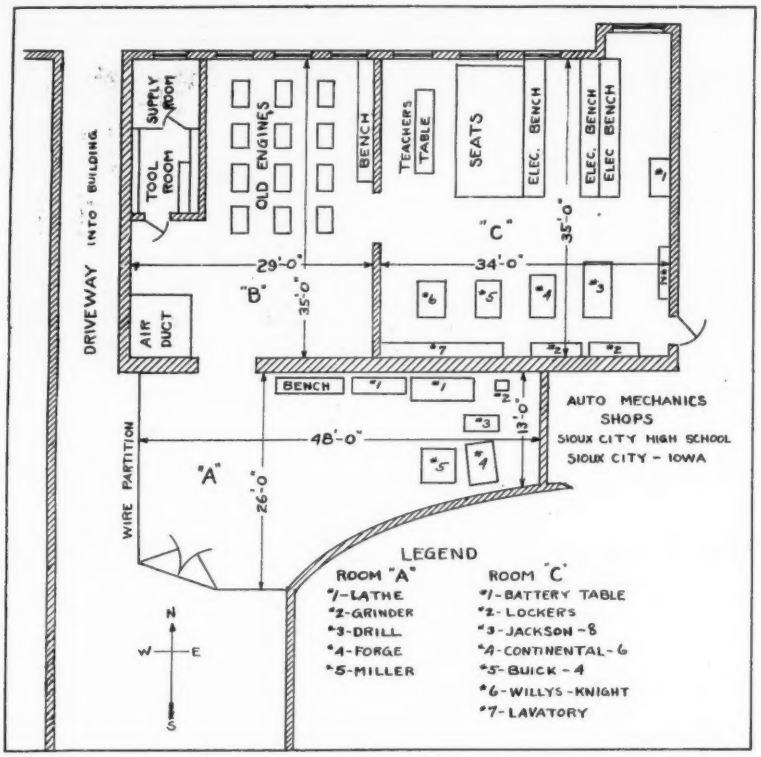
A light court, marked "A" on the shop layout, was roofed over for a shop and the adjoining room "B" given us for a classroom. Also about one hundred dollars more was put into tools and a second hand drill press and power emery wheel were purchased. In addition, we were allowed to buy three old Overland delivery cars at about $100 each upon the condition that we would keep one in shape so that it could be used in making deliveries to the various school buildings. As a matter of fact we managed by buying a few parts that were worn out on all three cars to keep one in service for two years.

Finally as the work continued to grow, the room "C", which originally had been the lathe room for the wood shop, was also given to the auto department. This space made possible classes of from 20 to 24 boys with a teacher and a shop assistant, and reduced the teacher cost to practically the same as that in our cabinet shop.

We have tried to work without any cars or parts belonging to the shop. We have tried working with nothing that did not belong to us and we have found that the most satisfactory way is to combine both methods. Enough engines and car parts are in the shop so that we can always have work for a class, but we also take in cars belonging to the boys or members of the faculty when the jobs to be done can be fitted in with our classwork.

One year, in order to allow the teacher to increase his salary and also because we thought the department should be better known around town, we tried permitting the teacher to bring in jobs to be done after hours and for which he would charge regular prices. We have also tried taking in commercial work and charging for it as a school,

but neither plan is at all satisfactory. The first increases the teacher's salary, but it is very hard not to do more or less of the work with the classes or during class time with the excuse that it is something the class ought to know. Probably it is something they should know, but it soon becomes a case of the teacher working while the class looks on—and that is not education. The second plan is open to the same objection and also the additional objection that people will not leave their cars with us long enough. Even most of the work on the school-owned cars is done by the teacher and assistant, after school and Saturdays, as the cars usually cannot be tied up long enough so that the work can be assigned to a class.



LAYOUT OF THE AUTO MECHANICS SHOPS IN THE SIOUX CITY HIGH SCHOOL, SIOUX CITY, IOWA.

Since our first teacher, who was one of the exceptional men in this work, we have tried the college trained man without much garage experience and also the mechanic without any teacher training, and have found them both failures. We then tried taking a normal school man and giving him a mechanic assistant. This worked very well especially as the mechanic immediately began to prepare to become a teacher. After a year together the teacher left to finish his college course and the mechanic was given full charge of the work. This man, a thorough mechanic, is attending summer school and taking correspondence work in an endeavor to obtain the education that will make it possible for him to hold a regular teacher's certificate, and since his whole heart and soul are in the work he is by far the best teacher of auto mechanics that we have had.

The bare outline of our course was given in the article on "Who and What to Teach" in the September number of this Magazine. At first we tried to follow this outline just as it is given, the second semester's work starting with engines. However, we have found that each year the incoming boys seem to know more about machines in general and are very anxious to get into engine work at once. To accommodate ourselves to this we are selecting the simpler engine jobs and putting them into the first semester in such a way that they are available at almost any point when needed by a particular class. This will probably mean that some of the work on the chassis will be pushed along into the second semester, but we still aim to cover, although not quite so thoroughly, the full first semester's work during that semester.

The diagram of our shops is almost self-explanatory. Room "C" is our classroom, wash room, electrical room anl "live engine" room. All of our electrical parts have come from old cars, junk yards, or wrecking companies and probably do not represent an outlay of over $150. The four "live" engines are mounted in home made stands, usually parts of the original car frame, and are piped with water and connected to an exhaust line so that they may be run. In this line we now have a Buick four, a Willys-Knight, a Continental six and a Jackson eight. These have been picked up during the last three years and have cost us about $200 as they were all in running condition. This year we have bought a Franklin six for $50 and have had given to us a Studebaker six and a Mitchell six.

Room "B" is our engine and rear axle room. Twelve engines are mounted, again on home made stands, in such a way that they may be easily turned over for bearing work. These are not running engines and are used for piston and bearing work. These engines have cost us practically nothing. For rear axle work we have saved the rear end assembly of various cars which we have wrecked and so have about all types quickly available for demonstration and classwork. In these two rooms are also mounted various types of front axles, steering gears, wheels, springs, transmissions, etc., as well as sectioned models used in class work. Most of these sectioned models have been made in the shop from parts of wrecked cars and so have not cost us anything. Our largest jobs of this nature are a complete Ford engine and two cylinders of a Stearns-Knight eight.

The large room "A", which originally was an open light court, is our repair shop and machine room. In this

room we can accommodate four or five cars at once for general overhauling. The shop is well equipped with machinery, most of which is not necessary although very desirable in a school auto shop. Several years ago we took advantage of the Government sales of surplus war materials and bought equipment with which to start a machine shop. The shop has never been started, so we have installed most of the machinery in our auto shop. In addition to this we have a welding outfit and an air compressor and about $250 worth of hand tools. However if the machinery, with the exception of the drill press, power grinder and forge, be excluded from our estimates I believe our entire equipment of tools and models could be replaced for less than $1,000. We could do without the welding outfit and the air compressor so that probably from $500 to $750 would about cover the cost. This does not mean that we, or anyone else, could go out and duplicate our equipment at once for any such figure, but given a good teacher and two or three years for development and the equipment could be just as complete as ours.

During the first year's work we follow the outline covering the chassis and engine quite thoroughly, yet not with the idea of making mechanics, but simply to give the boys a general knowledge of cars. Some of our boys leave to become mechanics and of course when such a boys is found he is given as much individual help as possible so that the work becomes for him largely vocational. The boys who stay for a second year's work are almost always those who are thinking definitely of following either mechanical trades or engineering courses in college. During this year, one-half of which is given to electrical work and the rest to general repair work, the course is handled more from the vocational or trade standpoint.

We feel that auto mechanics has fully justified itself in our general high school and community, that its cost is not out of proportion to other shop activities and that it is a valuable addition to our school curriculum.

Dynamic Symmetry in Design

R. Kimball, Beverly, Mass.

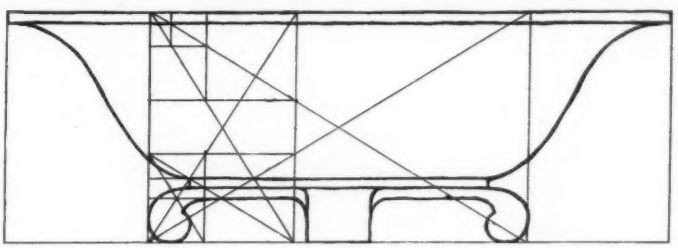
In a former article I showed the cutting and application of the simple rectangles of dynamic symmetery. Most of the Greek work is based on compound rectangles formed by grouping or cutting the simple ones, and in order to describe these simply and easily it is desirable to use numerical ratios. These may sound confusing at first. I have heard people refuse to have anything to do with the subject because they were afraid of the arithmetic, but the figures may be considered simply as the names of the different rectangles.

The ratio of end to side of the root five rectangle is 2.236+ and its reciprocal .4472; that of the whirling square rectangle is 1.618+ and its reciprocal .618. The compound rectangles used in this article are based on these two fundamental shapes.

First let us consider the table: The end of the table is constructed in an .809 shape. The decimal .809 equals one-half of 1.618 and describes a shape composed of two whirling square rectangles side by side, or as used here one above the other. The side of the table is constructed in a 1.118 shape. The number 1.118 equals one-half of 2.236 and describes a shape composed of two root five rectangles. If we divide 1.118 by .809 we obtain 1.382, which is the ratio of the rectangle composing the top of the table. This is a commonly used rectangle in dynamic symmetry and is composed of a large square, with a small square and whirling square rectangle applied to one end (see diagram).

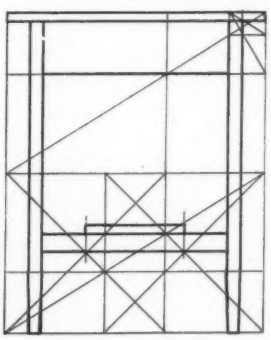
In designing the table within this solid, the root five rectangle of the side was subdivided by the use of whirling squares which gave exactly the same net on the side as on the end. Reciprocals of the small whirling square rectangles were cut off until the desired sizes were obtained. The table was built thirty inches high. That was the only dimension which came in even inches, but no fraction was used smaller than sixteenths, which of course, places it well within the reach of any boy who is able to do the construction required.

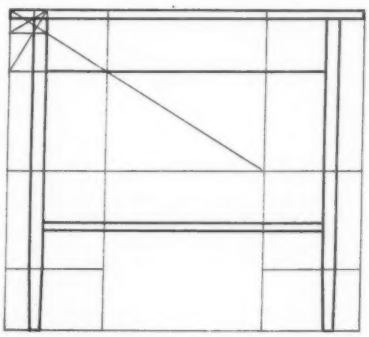
The design of the turned bowl is based on a whirling square rectangle plus two reciprocals, 1.618+.618+.618= 2.854. In this design, the eye of the large whirling square rectangle is used as well as spacings obtained from reciprocals. If a larger diameter were desired, squares could be used in place of the two reciprocals giving a 3.618 shape, which would also be pleasing. The original bowl was made 2¾" high, allowing the base to be turned from ¾" stock. For turned work we use full size drawings and take all dimensions with dividers or calipers direct from the drawing, thus getting all proportions exact.



A BOWL DESIGNED ON 2.854 SHAPE.

1.382





A TABLE DESIGNED ON THE BASIS OF .809 AND 1.118 RECTANGLES.

BRUCE-MILWAUKEE

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

EDITORIAL

DAILY PREPARATION FOR SHOP TEACHERS

One of the most important items in any teacher's success is his daily preparation for each and every recitation that he is called on to conduct. For a long time, and by a great many people, it was thought that a class in shop work required no special preparation from day to day on the part of the teacher. It was supposed that each pupil had a job in hand which he understood and that he would proceed with the construction while the teacher went about keeping order, answering emergency calls for help, and occasionally assigning some new work. Such classes have, indeed, been seen in operation, but they hardly qualify as classes at all and such a period of work cannot in any real sense be called a recitation.

The presumption is that in any real recitation a definite piece of work has been previously laid out, planned or assigned. In a shop class, it may be that individual problems, duties, or processes have been assigned. In any case, the teacher must not only know the general nature of the work for that particular recitation, but he must be familiar with each individual's problem and the next step that faces him in its solution. This means that accurate records must be kept concerning each pupil and his work and that the teacher must come to each class with a thorough knowledge of that class, its work, and the exact state of progress and needs of each individual in the class. He must not only have this kind of information at hand, but he must also have the best and latest information concerning the nature of the constructions involved in each project, the mechanical principles to be applied, the finish to be used, and any relations which the work in hand might bear to industry or any part of it.

Not only this, but the teacher must be prepared to give definite instructions and assignments for the succeeding lesson or lessons. Such instructions and assignments will, of course, include definite statements of necessary reference material. This item alone requires considerable time for preparation.

It is quite easy to maintain, therefore, that adequate preparation for the daily recitations in shop work requires more time and thought on the part of the teacher than the necessary preparation for recitations in many of the academic subjects of the curriculum. The time has come when the duty of such preparation on the part of the shop teachers cannot be escaped or neglected.

STUDY AND TEACH DESIGN

There is no more promising feature of recent art instruction than simple but effective design and composition.

The paper-cut picture and poster; simple, well spaced and well proportioned printing; figures in flat silhouette; flat pattern in few well chosen tones and colors; costumes, houses, toys or what not, rendered in the broadest, least difficult mediums and with thought for beauty and propriety will instil more of art conception than detailed renderings of Pharoh's Horses or The Last Supper.

The old-timer who recalls his Spencerian dexterity with a fine pen may have developed great interest in drypoint etching.

The fine arts will always be fine in expression if not always so fine in detail. Evidence of skill will always be interesting but the dexterous stunt of doing a difficult thing in the most difficult way has now found its proper place in vaudeville.

The schools have little use for vaudeville.

Much of the art of the old masters is simple and beautiful in effect. Some of it is messy and tiresome except to the antiquarian. Much of the art of the old masters is poorly drawn but beautiful and expressive. Some of it is well drawn but ugly and tiresome except to the draftsman. Age is no criterion of artistic excellence. Draftsmanship is a fine accomplishment but not always productive of a fine art.

The mediums and the methods used in teaching the graphical arts should be those that give the most expressive results with the least technical difficulty.

INFLUENCES OF TRADE CHANGES ON TRADE TRAINING

One of the greatest problems of vocational education is how to forsee the numerous changes that are certain to come to the various trades and how to prepare students for them. Within the brief span of one life, undreamed revolutions have occurred in many of the prominent trades.

Twenty-five years ago, when it took at least four years to learn the printing trade, the young printer learned to do everything from preparing copy to binding. His special work upon which he devoted long hours and months and years was in the acquiring of skill in typesetting and distribution, job press work, and the related processes necessary to these main tasks.

In this new day, the old-fashioned printer has found himself in strange company. Hand composition has been supplanted by the linotype and the monotype, both of which are puzzles to the old-fashioned printer. The press work is now done by an automatic feeder. The imposition, or stone work, has materially changed, due to the substitution of the linotype slug and the

electro plates for the hand composed pages of olden times.

The plumber, the blacksmith, and the cabinet maker have all found themselves in situations similar to that of the printer. There is but little reason to believe that changes will not continue to be made in all the trades. The problem, therefore, of preparing boys and girls for present day trades and at the same time of anticipating the probable changes so that the present day workers may not in a few years find themselves fatally handicapped, is a perfectly vital question for all teachers and workers in the field of vocational education.

No other one thing will go so far to remove the dangers involved in radical industrial changes as thorough-going theoretical courses in the essential character, principles, and methods of the trades in addition to the manipulative processes for the development of skill. It may not be that less time will be devoted to acquiring the skill of the trade; but certain it is that a broader and better technical education will be required for all tradesmen. In this way and in this way only can the individual workman prepare to adapt himself to the various changes that are probable in his trade during his trade experience.

THE GOOD AGENT

In spite of a sign on the front door prohibiting solicitors from doing business during school hours, our hero butted in and found the department where his competitor's goods were used exclusively. He came as a visiting citizen interested in the education and training of prospective citizens.

He exposed understanding of materials and their use that made it necessary for him to explain that he had studied and taught in a similar school but was now representing the makers of a fine line of goods.

He discussed methods in a most eager and inquisitive way, but carefully refrained from passing judgment on the materials supplied by his competitor.

He left a few samples but did not leave the impression of a dictator or a philanthropist.

His competitor's goods will probably not be used exclusively in our school. He was a good agent and for all we care the sign on the front door does not apply to him.

BOOKS AND THE READING HABIT

"Reading maketh a full man," said an old philosopher. A man full of information, wisdom, and understanding is one of the chief aims of all education. It is just as true now as it was in the long ago, that such an aim is quite largely achieved through reading. Books and periodicals of the right sort are veritable store houses of knowledge and wisdom upon which the individual may draw at will. The thought of the world sooner or later gets itself into books and one who has not learned the companionship of good books has largely cut himself off from the thought and wisdom and the companionship of the best minds of the world.

There was a time when books were looked upon by those in the industrial field with something of doubt and even sometimes with disrespect. Even textbooks were frowned upon for a long time by the shop teachers. This is happily now changed, but the habit of reading is not anything like as general as it should be among industrial teachers.

But what shall one read? A rather wise piece of advice has been frequently given to the effect that one should read about the things with which one is most familiar. This is certainly a good way to *begin,* and by a considerable stretch of the imagination this may be a good rule to follow indefinitely, if only one will conceive the things with which he is familiar as definitely related to numerous and sundry things with which he may be totally unfamiliar.

At any rate, one's reading should take one into the great, rich fields of literature, history, government, science, philosophy, religion, and art. This does not mean that one should try to exhaust all these fields of thought; but an educated person should have at least a "speaking acquaintance" with all of them. It is in these fields where men have reached the profoundest depths of thought. If one is to be a *world citizen,* he must familiarize himself with the thoughts that have occupied the best minds in the world and have made civilization.

A prominent director of vocational education in an important city can talk intelligently and interestingly about the best books in his own field, in literature, science, history, music, art, philosophy, etc. You wouldn't suspect it, either, if you saw him in his "shop clothes" guiding unerringly the plane, the saw, or the engine lathe. He has become a *world citizen by reading!*

When did he do it? During his *"odd times."* Anyone can do it; and no one has done himself justice until he has at least started himself wisely on the road to an intelligent reading habit.

According to a statement made by Dr. David Snedden of Columbia University, five per cent of America's 70,000,000 workers gain their training by the apprenticeship method, five per cent by the vocational school method, and 90 per cent by the "pickup" method. This pickup method, otherwise known as the university of hard knocks, kills dozens for every one that it brings into vocational proficiency and America is coming to realize that this method is expensive and inefficient.

The United Association of Journeymen Plumbers in a recent convention defended the vocational school idea. It was demonstrated that the schools turn out a better product than this can be done by the old-time apprentice system. Vocational schools are here to stay and labor will support them.

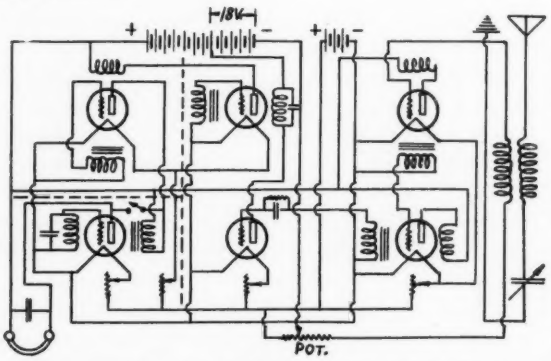
Practical Results of a Year in Amateur Radio Experimentation

A Radio-Receiving Set Featuring Third Stage of Audio, One-Tuning Control, and Especially Designed Horns as Loud Speakers

Claude S. Asp, Mountain Iron, Minn.

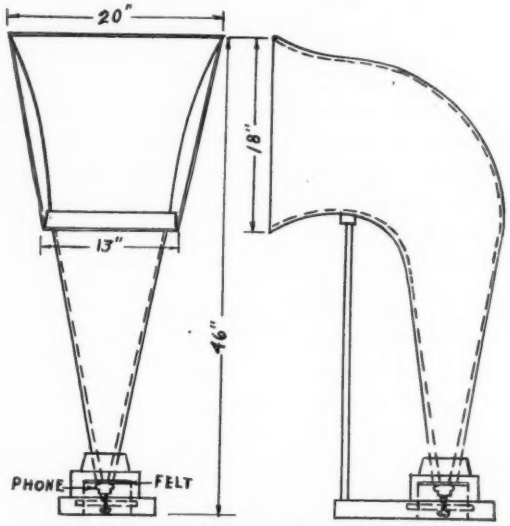
Something over a year ago the radio class in the high school at Mountain Iron, Minn., under the direction of the instructor in electricity and radio, started to make and assemble a radio-receiving set. The first attempt was a set with detector and two stages of audio frequency amplification. This set included two home-made variometers, a variocoupler with a tapped switch, and everything that was thought necessary for making a good set. But the variometers and the variable in the variocoupler, the many taps that are only a source of leakage, were found to be of no practical value and were soon eliminated.

The present set was built primarily for experimental purposes. The first attempt proved so successful that it was decided to enlarge the set making it useful for public entertainment through the receiving of popular radio programs in the high school auditorium. In order to accomplish this rather ambitious program, two stages of radio amplification were added. This, however, did not amplify enough for the purpose; hence an attempt was made to use a third stage of audio amplification, although most radio experts deemed it inexpedient. At first the hook-up was made in the usual haphazard way in order to find out how to make it work most successfully. Later the third stage of audio was permanently incorporated with the set and has proven the most valuable unit of the radio-receiving apparatus.



TWO STAGES RADIO DETECTOR—AND THREE OF AUDIO.

The different parts are of standard makes, and the loose coupler that we made ourselves, was mounted in a mahogany cabinet, 8" high, 10" wide and 20" long with a bakelite front panel. Two narrow board strips extend lengthwise from end to end in the set. On these strips the tubes were mounted on top and the transformers directly below as this arrangement allowed the shortest and most appropriate connections between tubes and transformers. The front panel together with the ends of the cabinet and all the parts could then be withdrawn, and made readily accessible for alterations and repair. The connections between the set and batteries were made by means of binding posts on the back panel. All parts were arranged as designated in the diagram shown herewith. The arrangement of aerial and ground are as shown because it permitted the shortest connections between those parts and the set. Great care was taken in the arrangement of the parts of the set to have all the leads as short and direct as possible. The dotted lines indicate a shield that was placed between the last stages of amplification. The shield and transformer cores were grounded. This is not shown since it proved to have no appreciable effect. A switch permits the last stage to be disconnected. There is also a three plate variable condenser in parallel with the large one. This is not shown since it is used only for experimental purposes.

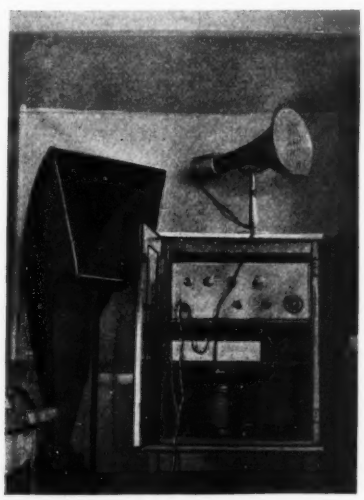


RADIO LOUD SPEAKER MADE OF BASSWOOD.

The radio cabinet was finally put into a larger cabinet of oak; it was placed on the top shelf; the "B" battery together with phones on the shelf directly below, and the "A" battery with the battery charger on the bottom shelf. A plug for connecting with the alternating light circuit was placed inside the cabinet.

Radio experts had warned us that the third stage of audio amplification would amplify only tube noises and static, and we had heard in a general way about the national complaint of that dreaded thing. Yes, we heard some of that "static" too in our metal loud speaker, which we now refer to as "noise-maker." However, similar metallic noises are produced in cheap tin phonograph horns. Working on that clue we set out with other experimenters to find a panacea for the ill.

Several wooden horns of different kinds of wood, sizes, and shapes were made and the results produced when these were used as loud speakers, were compared. The result of our experiment was the adoption of two wooden horns.



THE LOUD SPEAKER HORNS AND THE RECEIVING SET.

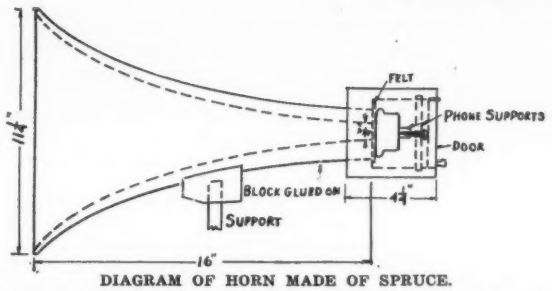


DIAGRAM OF HORN MADE OF SPRUCE.

One of these is very large and is made of basswood boards. This horn produces a soft and mellow sound, which it is able to throw out at a great distance when the signals come in very loud. The other horn was made from one piece of green spruce. Spruce was selected because it is used as a tone producer in violins. This horn measures over eleven inches across the front opening and is sixteen inches in length. The phone from the metal loud speaker that we bought was attached to this horn; it produces wonderfully loud and clear signals.

Some set employing a circuit with a perplexing and awe-inspiring name may be better suited for radio reception in or about a city with a local broadcasting station. But at a place some distance from one of these stations one can tune in, with nearly equal readiness, any of the larger broadcasting stations, within one or two thousand miles' distance, with a set employing a non-regenerative circuit.

These things, then, have made radio phone reception of popular programs successful, dependable, and a pleasure to the public: the quick tuning in of the principal broadcasting stations with one control, a 43-plate variable condenser, which is so simple that any normal child of 5 years can learn to operate the set successfully in one lesson; the third stage of audio, which amplifies the signals to such an extent that the whole audience in a large auditorium can hear them with ease; the proper arrangement and connection of the different parts of the set so as to eliminate distortion; the assignment of individual wave lengths to the large broadcasting stations; and the use of wooden horns that are true reproducers, thus eliminating the undesirable metallic effect of many, socalled, loud speakers.

Constructing a Cut Off Saw

Lloyd F. Hyatt and Harry D. Palmer, McKinley High School, Canton, Ohio.

Bill of Materials

8 pcs.	3½"x3½"x29⅛"	Oak. A.
4 pcs.	1½"x4½"x19½"	Oak. Top end rails and center Rail B
2 pcs.	1½"x4"x19½"	Oak. Bottom Rails C
1 pc.	1½"x4½"x11' 6"	Oak. Top front Rail D
1 pc.	1½"x4½"x48"	Oak. Top back Right Rail E. Top
1 pc.	1½"x4½"x60"	Oak. Top back Left Rail F. Top
1 pc.	1½"x4" x11' 6"	Oak. Top back Lower G.
1 pc.	1½"x4" x48"	Oak. Top front right H. Lower
1 pc.	1½"x4" x60"	Oak. Left front I.
2 pcs.	1½"x3½"x15"	Oak. J.
2 pcs.	1½"x4½"x24"	Oak. K.
1 pc.	1½"x4" x32"	Oak. L.
2 pcs.	2½"x3⅛"x20"	Oak. M.

Total, 175 ft.

Hundreds of feet of good material are wasted annually in the manual training departments of our schools in the simple operation of cutting lumber to length. It is a common practice to run boards ten or twelve feet in length through the planer, a practice which inevitably results in a very great waste of material as it is impossible to free boards of their "wind" in this manner.

It is absolutely necessary to cut the material to length first; then to run one side over the jointer to make one surface perfectly true, and after this to run it through the planer for the purpose of cutting to the required thickness. Where the manual training department is operated on the production basis to any extent, there is an unlimited amount of material to cut to length in the rough. In our class work desks are built in lots of from 25 to 100 at a time. To eliminate the great waste of material and time in doing this, we built, at a cost of about $50, without the motor, a cut-off saw that has stood the test and has done most excellent work. Hundreds of feet of various kinds of lumber have been cut on the machine shown. (Fig. 1.)

FIGURE 1.

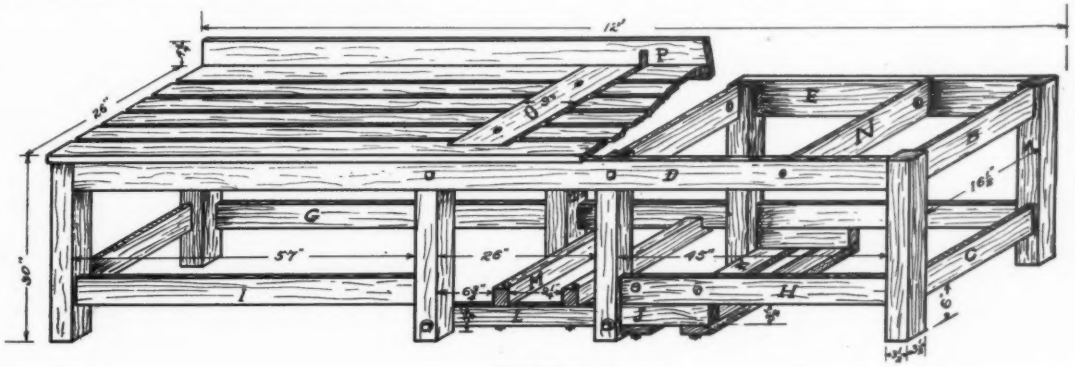


FIGURE 2.

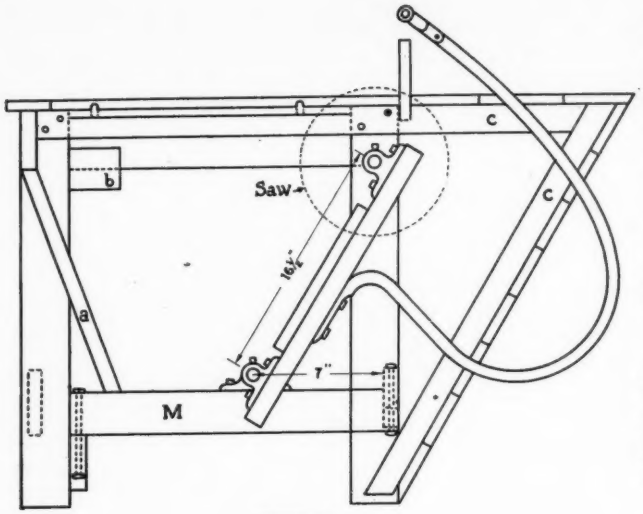


FIGURE 3.

It works equally as well as the overhead swing saw and has the decided advantage of the saw going *from* the student rather than toward him, in case it is cramped or catches in the material which is being cut. This machine is portable, the motor being mounted on a frame or table. It is possible to cut material up to 18" in width without turning it over. Figure 1 shows this machine operated by a student.

A careful study of the bill of materials and of Fig. 2 will show the size and construction of the table proper. The material used is plain oak and ¾" tenons are used in the construction. This size tenon makes the frame decidedly strong so it is almost entirely free from vibration. The rails D and G set flush with the outside of the legs and all others set ½" from the outside. The pieces K are held in place by ½"x7" bolts. An inch hole is first bored through H, then a hole is bored through the pieces J and K, and the bolts are inserted in these holes. Then the nuts are placed in the inch holes in H and G and tightened up. L is fastened to the legs of the table, being held in place by ½"x6" bolts, the top edge 5¼" from the floor. M is held in place by ½"x8" bolts. This joins the pieces M and L. M is cut out 1-3/16" on the top and rail G is cut out 1-3/16" on the under side, making the rails M perfectly level. The ends are bolted to G with ½"x6" bolts. (Where bolts are used it is well to use washers.) The measurements for bolting M and K to the table are given in Fig. 2. O shows the piece that is fitted in the top of the table next to the saw. This piece can be removed for the purpose of oiling and changing saws. The space between this piece and the slats for saw clearance is ¾", being held in place by two pegs glued into a piece that has been screwed to the slats. These pins fit into holes in O, preventing it from getting into the saw.

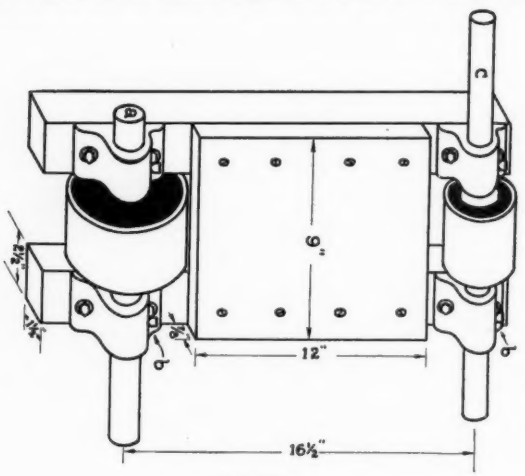


FIGURE 4.

The bearings, bolted to M (Fig. 3) which form the hinge for the arm on which the saw swings back and forth, must be placed 7" from G to the center of the bearing. It is important that extreme care be exercised in placing these bearings accurately as a slight variation may cause the saw to cramp.

The handle is made of ⅞" gas pipe, bent as shown in Fig. 3, on the end of which is riveted a spade handle. *A*, Fig. 3, shows a piece of material 12" wide nailed in place for the purpose of preventing the operator from getting his knee into the saw. B shows a stop block which prevents the saw from coming too far forward.

C shows a guard which must be built on the table if the machine is to be placed in the center of the room. It is necessary to cut a hole in the back of this to allow the handle to protrude when the saw is back out of place. It is necessary to put blocks to serve as a stop for the saw when dropped back. This distance is best obtained by allowing the saw to go back until boards being slid up to be cut off cannot strike the saw teeth.

The construction of the arm shown in Fig. 4 is decidedly important. A very good grade of material is necessary and the work must be done accurately. The arm is made of two pieces of 1½"x2½"x21" and one piece of ¾"x9"x12". The grain of the latter must run the 9" way. The four bearings for this arm must have the oil cups on the side of the bearing b, Fig. 4. This will retain the oil which would soon run out if bearings such as those used on M, Fig. 3, were used. The saw is placed on the maudrel *c* which is threaded with a left-hand thread.

The problem of handling supplies in school shops and work-rooms seems to be of considerable importance.

VOCATIONAL EDUCATION ASSOCIATION OF THE MIDDLE WEST MEETS IN CHICAGO

The eleventh annual meeting of the above association will be held at the Sherman Hotel, Chicago, February 12, 13, 14. Lewis Gustafson the president of the association, and W. J. Bogan the chairman of the program committee are already planning a strong program. During the past year there has been increased interest in vocational education in many parts of the middle west and this will be reflected in the program.

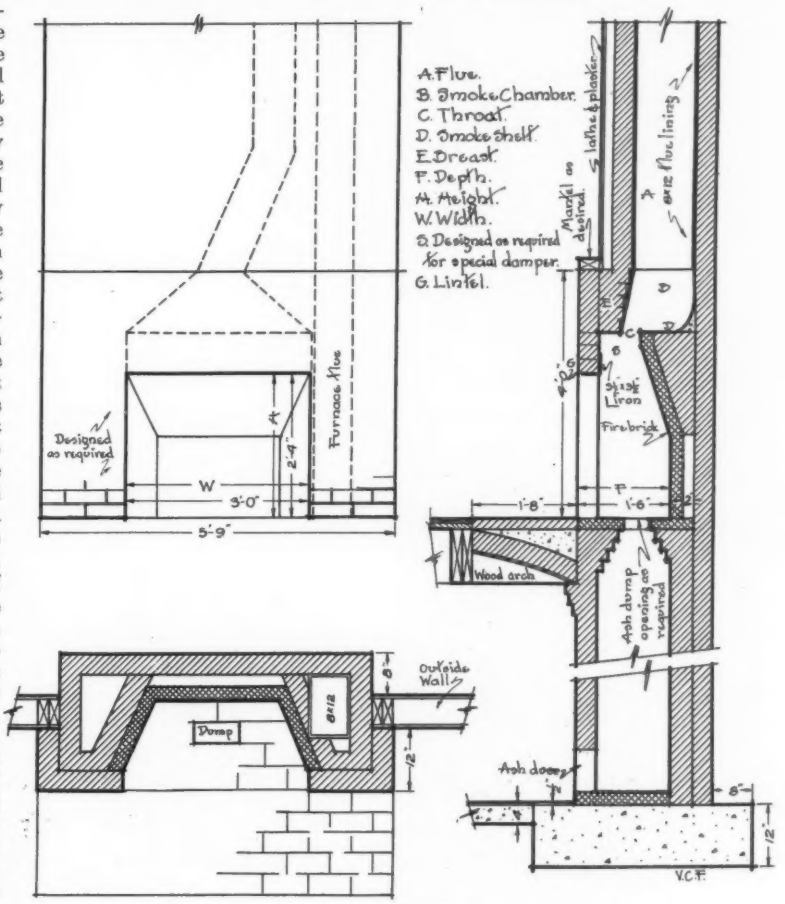
The Junior High School movement will occupy a prominent place on the program and this will be a particularly timely subject in view of the adoption of this type of work by the City of Chicago. The sectional meetings will be under the following chairmen: Industrial Education, W. T. Bawden, assistant superintendent of schools, Tulsa, Okla.; Agricultural Education, J. A. James, University of Wisconsin; Vocational Guidance, Jos. V. Hanna, Joliet Township High School, Joliet, Ill.; Commercial Education, H. M. Winkel, Milwaukee Vocational School; L. Day Perry, Chicago, is chairman of the local committee.

Hold Foreman Conference. **A Foreman Conference was recently held at the plant of the Pejepscot Paper Co., Brunswick, Me., under the auspices of the Maine state board of education. The conference was conducted by Mr. G. A. McGarvey, Regional Agent of the Federal Board for Vocational Education. Mr. Fred C. Clark, General Manager of the Pejepscot Paper Co., led for the firm. State Supt. of Schools, A. O. Thomas, and Mr. E. K. Jenkins, Director of Vocational Education for Maine, were also present during the conference.**

High Points in Fireplace Construction

Verne C. Fryklund, Instructor in Architectural Drawing, Teachers' College, Kearney, Nebraska

The fireplace as one of the central features of the home should be given careful consideration. The form, proportion, and material should be such as to render it useful as well as ornamental. The opening in the fireplace is usually controlled by the desired total size of the fireplace as well as the fuel used. In order that satisfactory results may be obtained from the fireplace it is essential that certain points be followed. First, that the flue have an area equal to about one-tenth of the area of the fireplace opening and lined inside with special flue lining to the top of the smoke chamber. Second, the throat should be placed from 6 to 8 inches above the lintel and the throat opening 4 inches wide in order to insure proper draft. The space above the lintel should have vertical walls until the throat is reached. A fireplace constructed without this consideration would be of no value. Third, the smoke chamber and shelf must be properly constructed. The smoke shelf should be no less than 4 inches wide and still better up to 12 inches. The chamber can be drawn inward about one foot per 18 inches of rise. It should be large in volume, extend from the throat to the chimney proper, and should be smooth on the inside. The shelf deflects any downward current and the chamber holds any accumulation of smoke from a sudden down draft. Fifth, the shape of the fireplace proper should be such as to direct a maximum amount of heat into the room. The depth may vary from 16 to 24 inches according to the size of the fireplace.



DETAILS OF FIREPLACE.

Eighteen inches is very common and effective. The lining should be of firebrick. The rear wall should be about two-thirds of the width of the opening to allow the proper heat deflection. It should rise vertically to a point about sixteen inches above the floor, and should then draw in to the throat.

A number of general points of construction are worth considering. The hearth may vary from 16 to 22 inches. A common depth is 20 inches. The hearth serves to protect the floor from glowing embers and ashes. The fire brick should be placed on the bottom and on all sides of the fire box. It may be placed on edge or flat; placing on edge is economical and provides a desirable air space. The total thickness of the rear wall should be at least eight inches. The chimney should be carried high above the roof line; two or three feet is a good clearance. It is well to think of fireplace design in terms of brick sizes. The average brick is 2½"x4"x8".

The construction under the hearth should be as shown in the drawing to eliminate any possibility of cracking of the hearth above. All masonry and carpentry should be done independently of the fireplace construction. The basement wall should not be a part of the fireplace ash pit but should be run separately; a brick wall should wholly line the ash pit on all sides. The basement wall should not be part of the end of the ash pit. The footing for a fireplace should project out 8 inches all around and 12 inches deep. The framing of carpentry should not be attached to any portion of fireplace or chimney as any settling of brickwork would cause cracking in the wall.

The above points are the essentials of correct fireplace construction and if followed carefully should give a very satisfactory fireplace. The size of the fireplace may be altered. That shown here is the most common.

RATING CARD FOR RELATED SUBJECTS IN THE TRADE SCHOOL

John F. Locke, Department of Vocational Education, Cincinnati, Ohio.

There is no positive method by which students in "related subjects" can be graded. Merely a correct answer to all of the exercises does not, of necessity, mean a perfect mark. A great deal of the work in the various subjects: English, mathematics, history, science, etc., can be learned by rote. But knowledge gained in this way does not remain in the individual's mind very long. Speed or lack of it are not real criterions of either perfection or failure. It must be borne in mind that the boy who performs his work the slowest, may be the one who is both working the hardest and absorbing the most.

A grading schedule must, of necessity, be used but great care must be exercised to see that each boy is graded according to his ability and previous training. In trade courses there are many factors which must be taken into consideration and which do not enter in regular academic work. The factors that should be considered when rating apprentices in "related subjects" and the way of arriving at and recording his progress, form a big problem for an instructor and ought to be one of the features of his work to which he devotes no little time

and thought. In order that an apprentice may be rated fairly and justly, guess work and the personal element must be eliminated.

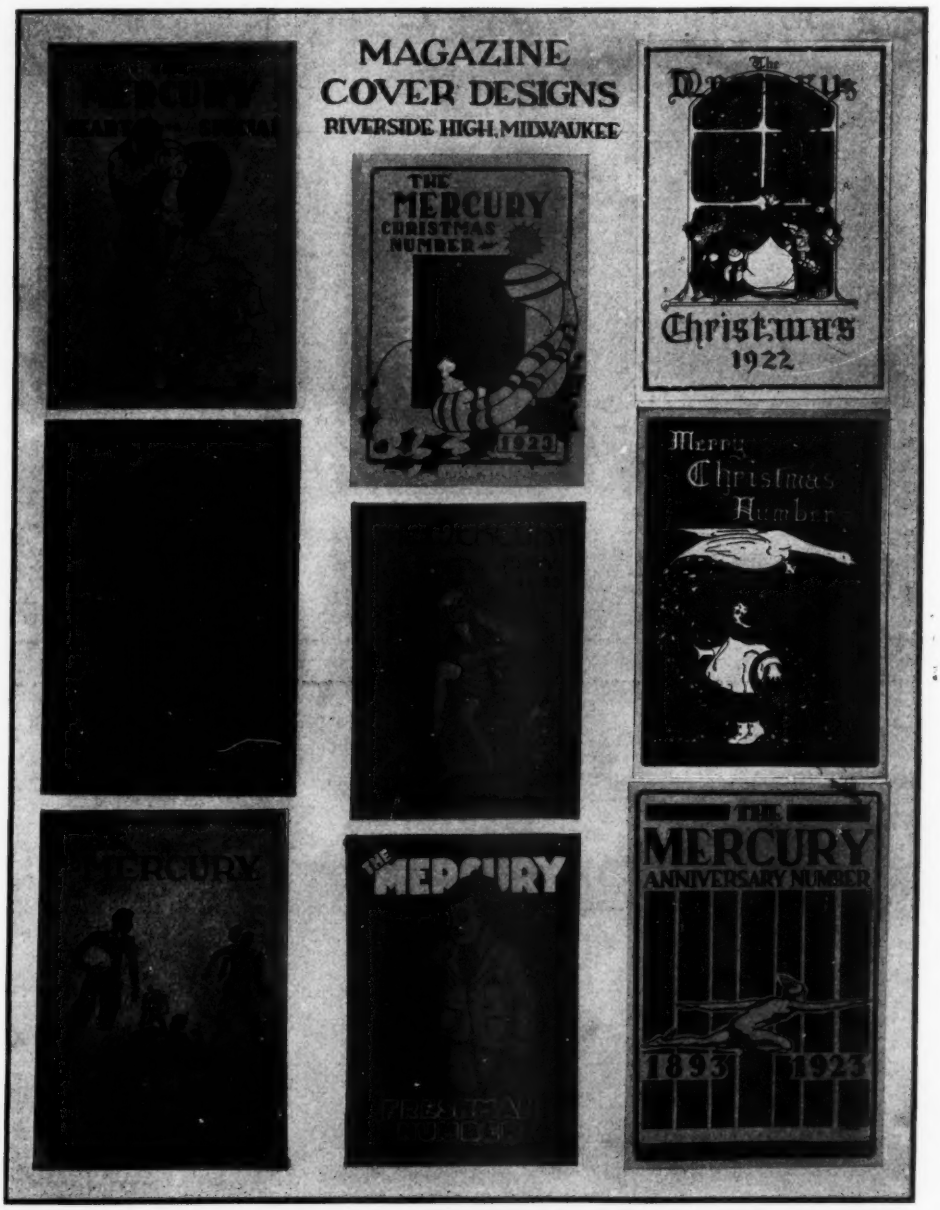
The accompanying table has been used successfully for about one year. It is patterned after the U. T. A. rating tables. Perfection in the factors: time, correctness, neatness, attitude, and aptitude are each given certain percentages which total 100. Different degrees of ability of these factors receive different percentages as shown in the table.

Comparatively few boys make any effort toward checking the accuracy of their work until told to do so; many seem to feel that if the method of solving the problem is correct a slight inaccuracy should be over-looked.

After testing a number of classes I came to the conclusion that a little time could well be spent in working simple problems, such as would be encountered in the drafting room, and worked out a set of such problems.

The accompanying illustrations are typical of the group which began with very elementary grade school arithmetic. They include examples of many of the common problems which may be met by a boy employed in a drafting room. The time spent in this sort of drill has, I believe, been of considerable value to the pupils belonging to the class.

RATING FACTORS	F	E	D	C	B	A
Time Determined by the celerity and dispatch with which student performs his work.	Inert 15 points	Slack 18 points	Dilatory 21 points	Moderate 24 points	Rapid 27 points	Swift 30 points
Correctness Based upon answers and acquaintance with subject.	Very poor 20 points	Poor 24 points	Unsatisfactory 28 points	Fair 32 points	Satisfactory 36 points	Perfect 40 points
Neatness Based upon care of lessons, appearance and sequence of written work.	Slovenly 5 points	Negligent 6 points	Cursory 7 points	Clean 8 points	Tidy 9 points	Immaculate 10 points
Attitude The student's mental reaction toward his work.	Indifferent 5 points	Perfunctory 6 points	Passive 7 points	Interested 8 points	Eager 9 point	Enthusiastic 10 points
Aptitude The native tendency of the individual to acquire skill in this line of work.	Stupid 5 points	Bungling 6 points	Clumsy 7 points	Handy 8 points	Capable 9 points	Adept 10 points



RECENT COVER DESIGNS USED ON THE SCHOOL PAPER OF THE RIVERSIDE HIGH SCHOOL, MILWAUKEE.
Miss Rachel Skinner, Director of Art Instruction.

PROBLEMS & PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, pattern-making, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration.

RUG LOOM

Robert Runge, Springfield, Mo.

The loom illustrated in the accompanying halftone engraving and assembly drawing was made by the shop work classes in the Springfield High School and is used by the girls in the Arts and Crafts department. The material used in making the loom was pine and oak which was available, but other hard wood might very readily be substituted. The cording device is of commercial make and was obtained from the Union Loom Company of Boonville, New York. It is better to purchase this device from a loom manufacturer rather than make it in the school.

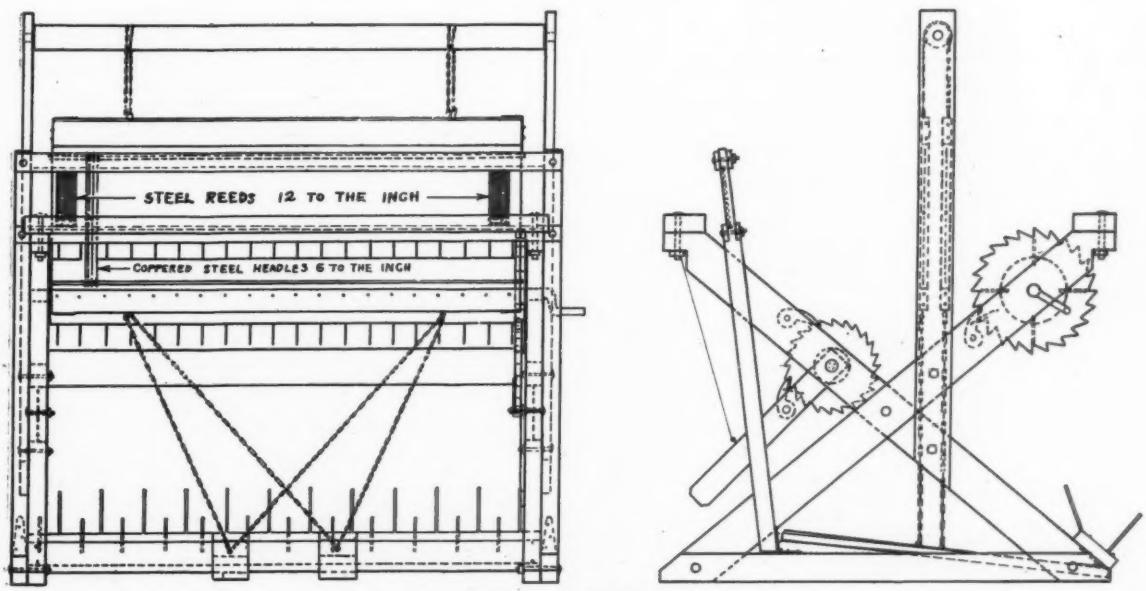
The assembly drawing is accurate to scale and can be used for developing a complete set of working drawings in any school. The bill of materials is as follows:

4 pc.	2″x 4″x48″	pine.
2 pc.	2″x 4″x44″	pine.
2 pc.	2″x 3″x38″	pine.
2 pc.	2″x 2″x34½″	pine.
2 pc.	2″x 2″x46″	pine.
2 pc.	1″x 4″x43″	pine.
2 pc.	1″x 3″x40″	pine.
2 pc.	1″x 4″x28″	pine.
1 pc.	3″x 3″x39″	pine (roller for carpet).
1 pc.	6″x 6″x39″	pine (roller for warp).

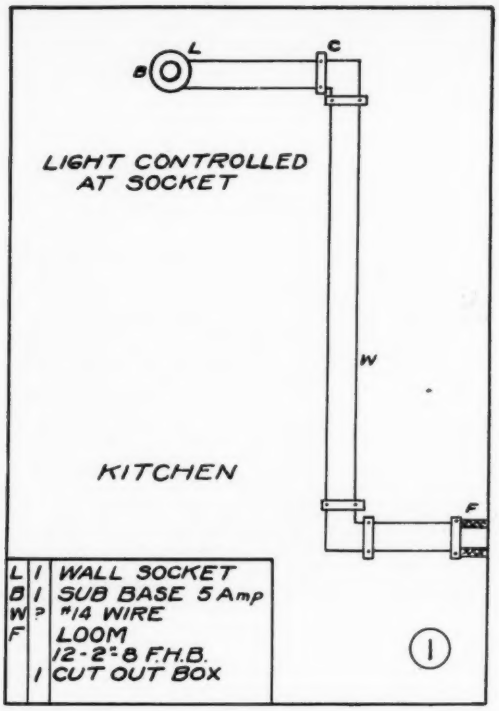
THE LOOM WITH TYPICAL PRODUCTS AT THE LEFT.

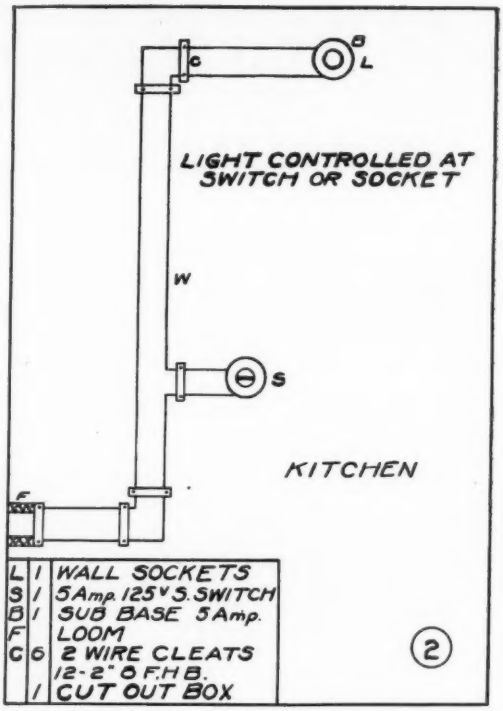
1 pc. 2″x 2″x45″ pine (roller for chain which works headles).
1 pc. 1″x11″x11″ birch (large rachet wheel).
1 pc. ¾″x 8″x 8″ birch (small rachet wheel).
1 pc. ¼″x 2″x17″ birch (handle, working rachet).
3 pins 1″ dia. x 5″ long birch (to be set 2½″ in rollers).
1 crank (for large roller).
3 pawls birch (to work rachets).
24 ⅜″ dowell pins 6″ long (to hold spools while warping).
80 ¼″ dowel pins 3″ long (to be set 1″ in large roller).
13 feet of chain.
2 4″ strap hinges.

SCALE IN FEET



DETAILS OF RUG LOOM.




LIGHT CONTROLLED AT SWITCH OR SOCKET
KITCHEN
L 1 WALL SOCKETS
S 1 5 Amp. 125 V. S. SWITCH
B 1 SUB BASE 5 Amp.
F LOOM
C 6 2 WIRE CLEATS
12-2" 0 F.H.B.
1 CUT OUT BOX
2

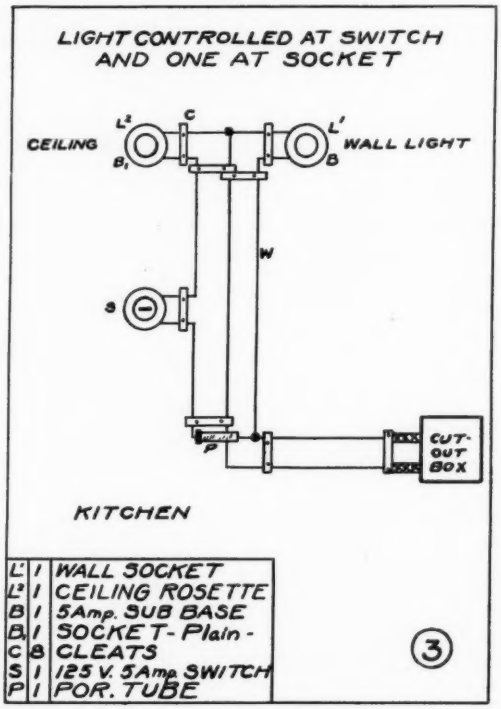
2 6″ tee hinges.
2 headles. } To be bought complete from
1 reed (12 to inch) } manufacturer.)
Bolts and screws as needed.

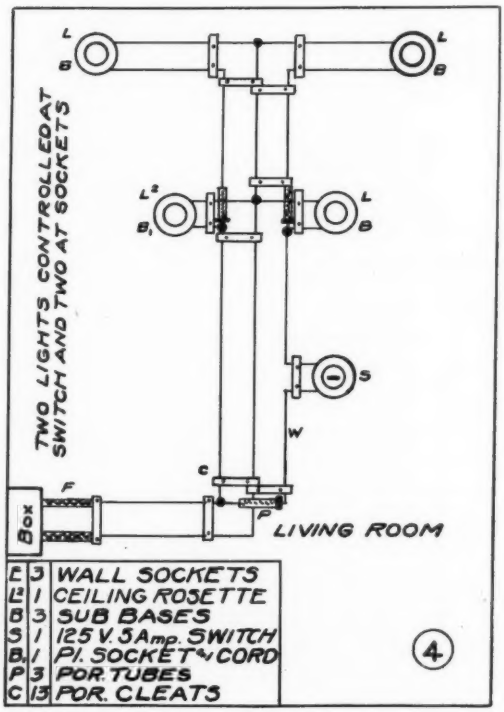
The rugs which are woven in the Springfield High School are made with commercial warp of different colors and woof made of scrap rags, cotton, silk, or wool as available.

PROBLEMS IN ELECTRICAL WIRING

Emerson W. Manzer, Madison, Wis.

The accompanying four plates are practically self explanatory. They are the introductory problems in a course in elementary electrical work and fit well into a general industrial arts course for secondary schools. They can be worked out best on a standard electrical experiment board.

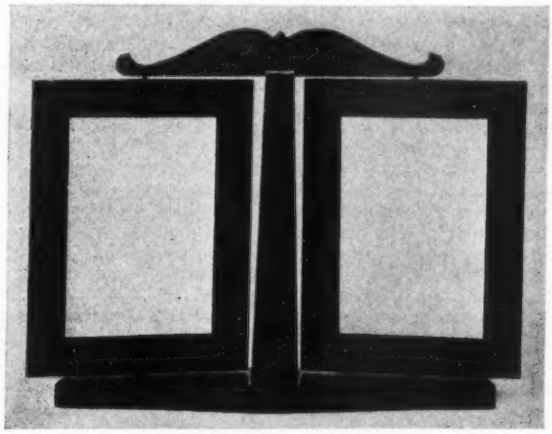



TWO LIGHTS CONTROLLED AT SWITCH AND TWO AT SOCKETS
Box
LIVING ROOM
L 3 WALL SOCKETS
L² 1 CEILING ROSETTE
B 3 SUB BASES
S 1 125 V. 5 Amp. SWITCH
B₁ 1 PI. SOCKET & CORD
P 3 POR. TUBES
C 13 POR. CLEATS
4

DUPLEX PHOTO FRAME

John S. Rashinsky, Instructor of Manual Training, Mineral Street School, Milwaukee

This problem is most suitable for seventh, eighth, and ninth grades. In the seventh and eighth grades it is advisable to construct the project along simple lines, while for the further advanced pupils there is abundant opportunity to bring in more elaborate designing and inlay work.



THE FRAME READY FOR PICTURES.

It finishes beautifully in walnut, using two coats of shellac and a wax polish. Other material may be used, according to the individual taste.

The project was designed with the idea of employing many of the commonly used tools; also teaching the child absolute accuracy in the handling of tools. The frame can be made any size desired, but the size (4½"x6½"), is chosen because it is the average standard photograph size.

The two frames are made first. If there is no circular saw in the shop, the rabbet must be cut before the width of the frame is cut from the wide stock. Some difficulty will be found in the lower grades in cutting the mitres of the frames as it is very important that both of the frames be the same size. It will be found that better joints are made by planing the mitres before gluing, which is easily accomplished by the use of a small shoot-board plane. A groove is cut out of the standard, into which the beam is set and glued. The pivot pins are made from two 2-inch escutcheon pins. The entire project is held with one 1½" No. 11 flat head bright screw. It is advisable to finish each part completely, including the polishing, before assembling.

The problem creates great interest with the classes, because it is appropriate for a gift, because it does not require any great length of time for construction, and the cost of the article is small in comparison with its value as a finished article.

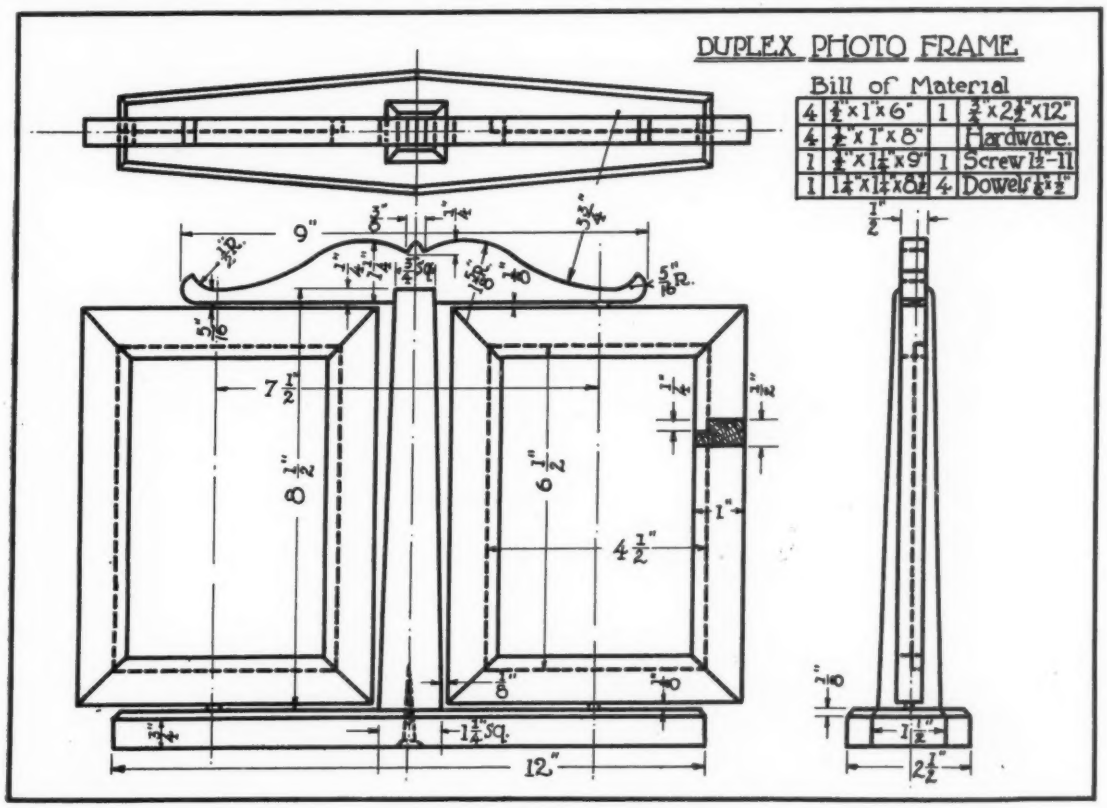
FOOTSTOOL

Arthur E. Bidney, Steubenville, Ohio.

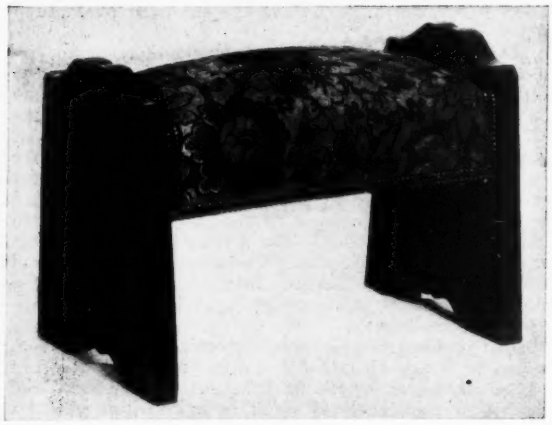
The footstool is perhaps one of the oldest of manual training projects, the construction of which is simple. Nevertheless it involves many different problems so essential to elementary woodwork.

The author designed the project with problems in mind, not forgetting that manual training is not only the making of a piece of furniture that is pleasing to the eye. It involves practically the same problems and tool operations that the old German footstool does. As certain processes have to be taught why not give the boys something better looking? Usually we are content with straight lines in our design in woodwork, principally because it makes our work easier, or we think that boys are incapable of refining a project.

Chestnut, which is the most desirable wood for the eighth grade, was not available so it was necessary to use white oak for the two ends of the stool. The rails, screw

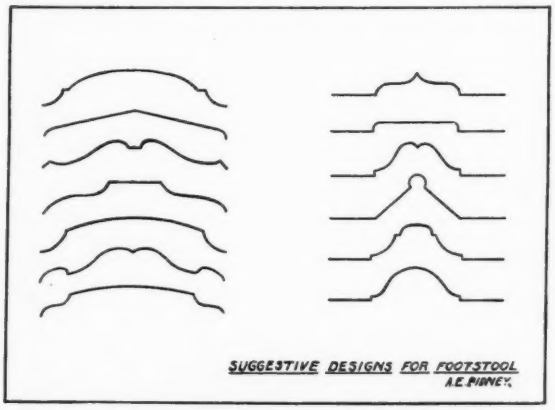


DETAILS OF DUPLEX PHOTO FRAME.



A FOOTSTOOL.

block, and top may be made of poplar or any good light wood. Plane the ends to the desired thickness, squaring one edge and one end. Measure up 10⅝″ from the working end and square a line across from the working edge.



Lay off 4⅝″ on the working end and with the beam of the square against the end draw a line from the point found the length of the piece. This is the center line from which all measuring is done when laying out the shape of the end. Next measure 9¼″ on the base end from the working edge; this is the width of the base. On the top end measure 3⅞″ on each side of the center line. Then from these points draw lines to the extremities of the base. Plane the sides to the lines. Cut a templet the shape of the piece to be cut out of the base and also one for the shape of the top and trace the shape of the templets on the wood. After the ends are done, prepare the side rails, screw blocks and top. After sanding the two ends, assemble the stool, using 1¾″ No. 8 flat head bright screws to fasten the blocks to the ends and 1½″ No. 8 screws for the rails. Four shingle nails are sufficient to hold the top to the blocks. The ends were stained Italian Oak, given a coat of shellac, sanded, another coat of shellac, sanded again, the pores filled with rotten stone, and then given two coats of wax. Tow, muslin and tapestry were used in the upholstering.

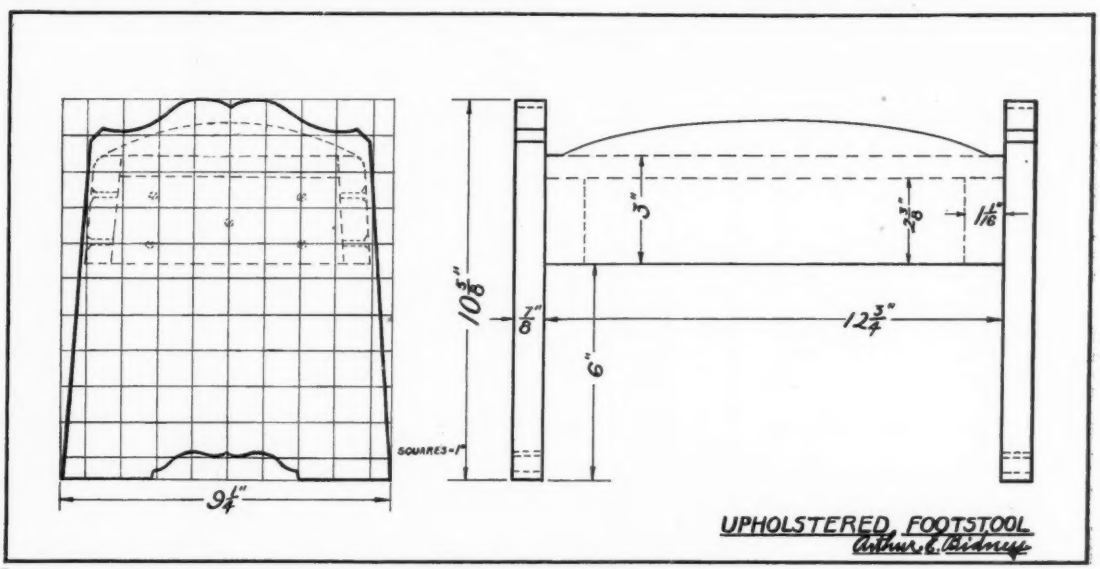
This stool as a project was used very successfully in grade 8 A, the boys being perfectly willing to put in extra effort and energy to obtain a more pleasing result. The contour or outline can, of course, be varied as shown by the suggestive designs the author has drawn.

DRESSING TABLE STOOL

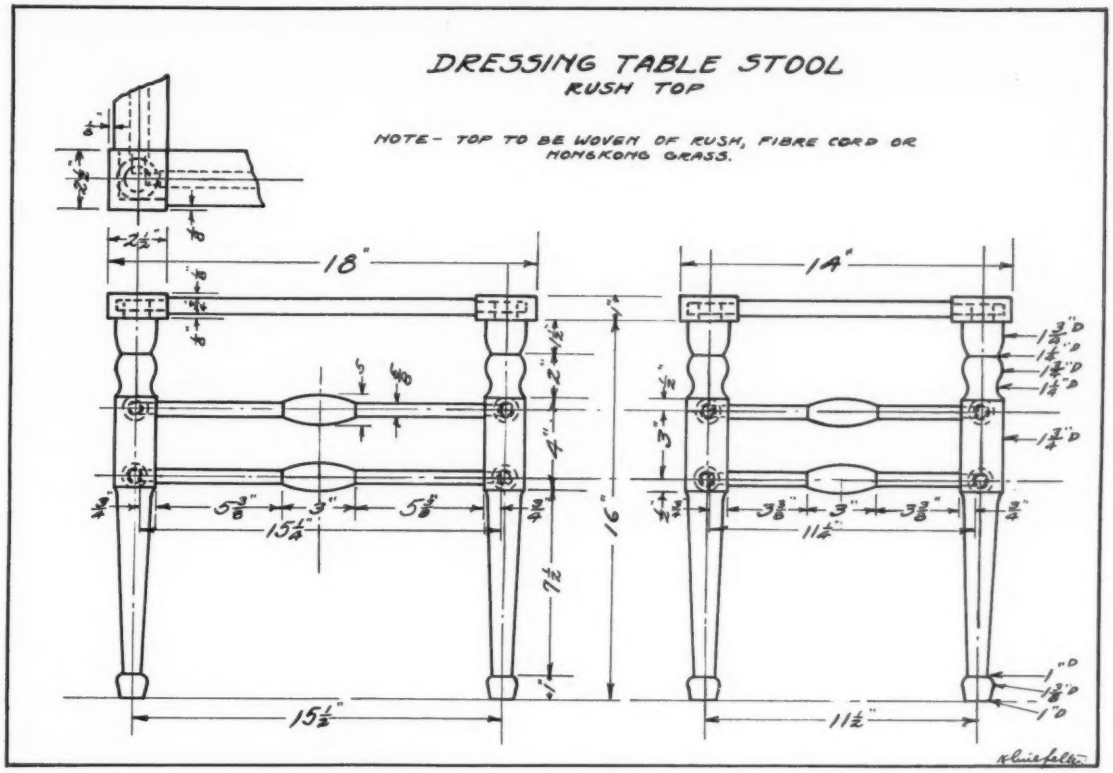
Lee M. Klinefelter

This stool makes an attractive and useful problem, involving as it does the turning of duplicate parts, accurate

DRESSING TABLE CHAIR.



DETAILS OF A FOOTSTOOL.



DETAILS OF DRESSING TABLE STOOL.

assembling and seat weaving. It may be made of any suitable hard wood, the one shown in the photograph being of mahogany.

If the sides are assembled before boring the holes for the end rounds, much less trouble will be experienced in getting these holes at the proper angle to insure a good square seat.

All the finish excepting the final coat of varnish can be applied to the rounds and legs while they are in the lathe, thus saving considerable work in rubbing down shellac and varnish. The corners of the top should also be finished, with the exception of the final varnish coat before weaving.

The seat may be woven of rush, Hongkong grass, fibre or read, or a caned seat may be substituted. The seat shown in the photo is of Hongkong grass, which is much less trouble than rush, and has a good natural color. Directions for weaving such a seat are to be found in several books and magazine articles on the subject.

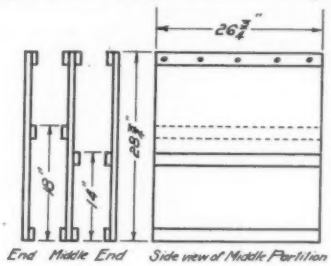
THE MAKING OF A FINISHING BENCH AS A PRACTICAL PROBLEM

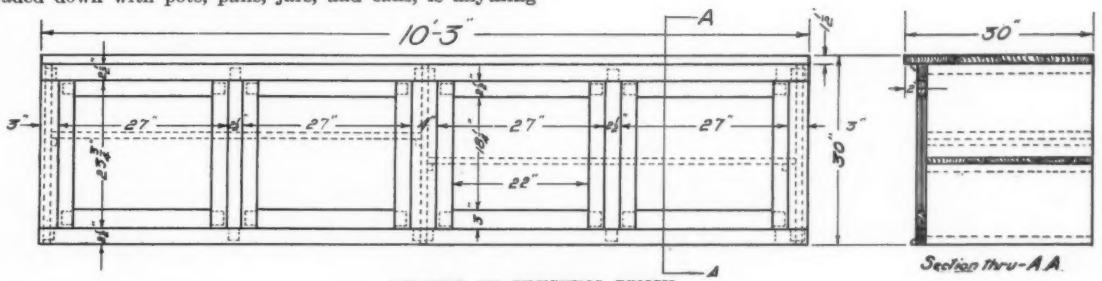
By Frederick W. Voss, Instructor of Manual Training, Miles City, Montana

It is a well known fact that students take more interest in a well kept shop than in one poorly equipped. To step into a shop or finishing room having a bench loaded down with pots, pails, jars, and cans, is anything but invigorating to the boy. The writer has had experience with this very condition, and it was through dissatisfaction with the existing condition that the boys were made to see how their work could be made easier and more pleasant if they had a finishing bench upon which they could work freely.

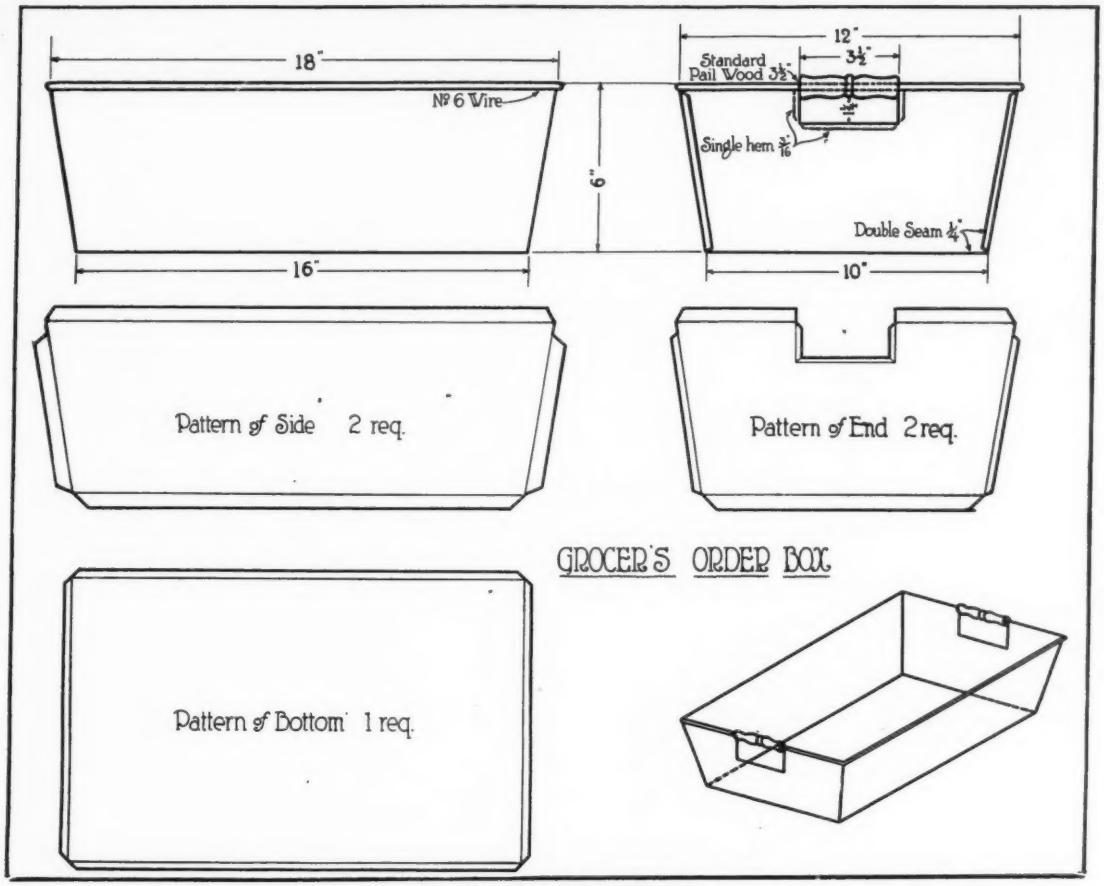
The boys showed great enthusiasm to do their share in constructing a bench suitable for their needs. The design of the bench was developed and its location decided upon. The stock was gotten out by the seventh and eighth grade boys, the parts were made by them, put together, and placed with surprising care and accuracy.

The ends and middle partition were squared up and





DETAILS OF FINISHING BENCH.



DETAILS OF GROCER'S ORDER BOX.

fastened securely by means of 1½" corner braces. The front was then put in place and fastened the top and bottom to the ends and middle partition by means of 1½" corner braces. The top was fastened by driving screws through into the ends and middle partition. The top was then covered with 28-gauge galvanized iron which can be kept clean.

Bill of Materials

No.	Name	Size	Stock
		FRONT	
2	Rails	1¼"x2½x10'-3"	White Pine
2	Stiles	1¼"x3"x27¾"	White Pine
2	Stiles	1¼"x2½"x27¾"	White Pine
1	Stile	1¼"x4"x27¾"	White Pine
1	Cove Moulding	¾"x10'-3"	White Pine
1	¼ Rd. Moulding	¾"x10'-3"	White Pine
		DOORS	
8	Stiles	1¼"x2½"x23¾"	White Pine
4	Top Rails	1¼"x2½"x26"	White Pine
4	Bottom Rails	1¼"x3"x26"	White Pine
4	3-ply Fir Panels	⅛"x18¾"x22½"	Fir
4	Pair Butts	2" light narrow	Steel—L. P.
4	Push Catches		
		ENDS AND MIDDLE PARTITION	
2	Ends	¾"x26¾"x28¾"	White Pine—3 pcs.
1	Middle Partition	¾"x26¾"x28¾"	White Pine—3 pcs.
12	Cleats	¾"x1¾"x26¼"	White Pine—3 pcs.
60	Screws	1¼"—No. 10	F. H. B.
12	Corner Braces	1½"x½"	Steel
24	Screws	⅝"—No. 7	F. H. B.
		SHELVES	
2	Shelves	¾"x26½"x59"	White Pine
		TOP	
1	Top	1½"x30"x10'-3"	No. 4 Pine
1	Covering	32½"x10'-3"	No. 28 Galv. Iron

GROCER'S ORDER BOX

L. J. Schuerer, Manitowoc, Wisconsin

The accompanying drawing illustrates a grocer's order box such as is used in the delivering of groceries to customers. It is an excellent project for the student in that it embodies operations essential to sheet metal work.

Galvanized iron, No. 26 gauge is used. The handles are 3½ inch standard pail woods which can be procured from any sheet metal supply house.

Order of Operations

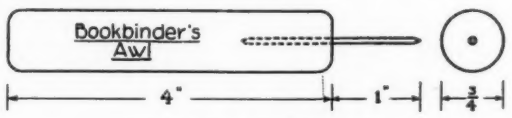
1. Layout patterns on paper.
2. Transfer patterns to metal.
3. Cut to shape.
4. Single hem edges of ends at handle.
5. Fold single edges on end and bottom edges of side pieces.
6. Fold single edges on bottom edge of end piece.
7. Fold 90 degree angle fold on side edges of ends.
8. Fold 90 degree angle fold on all edges of bottom.
9. Fold wire edge on side and end pieces.
10. Double seam end and side pieces together.
11. Double seam bottom to ends and sides.
12. Bend wire to shape and wire.

Care should be taken to place pail woods in proper place when bending wire.

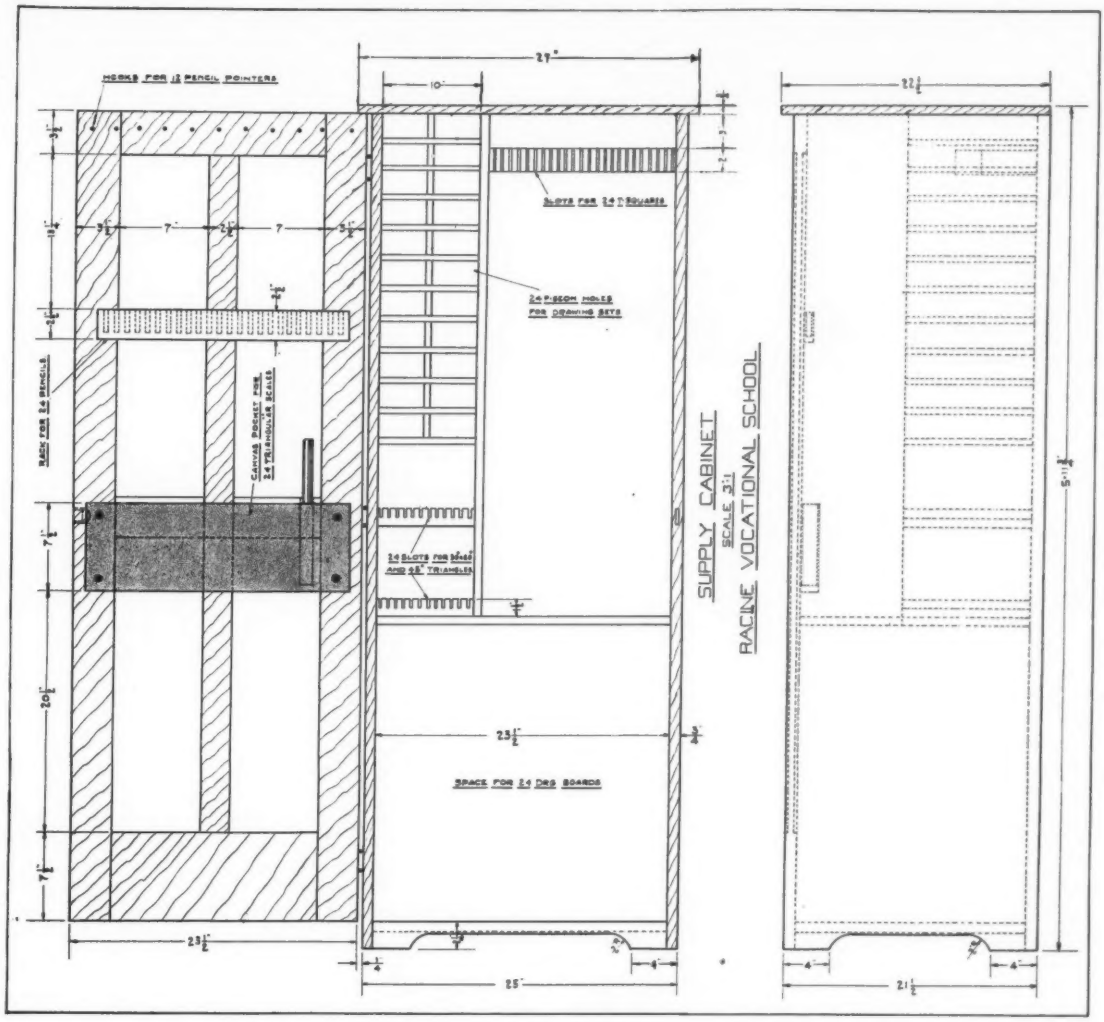
AN AWL FOR ELEMENTARY BOOK MAKING

William V. Winslow, North Tonawanda, N. Y.

In the teaching of elementary industrial arts it is often convenient, if not necessary, to have awls with which to carry on the work. These awls are of considerable advantage in the making of booklets, where several thicknesses of paper are inserted into a cover and the whole punched to receive twine for binding.



DETAILS OF A BINDER'S AWL.


HOOKS FOR 12 PENCIL POINTERS
SLOTS FOR 24 T SQUARES
24 P.SECM. HOLES FOR DRAWING SETS
RACK FOR 24 PENCILS
CANVAS POCKET FOR 24 TRIANGULAR SCALES
24 SLOTS FOR BOARDS AND 48" TRIANGLES
SPACE FOR 24 DRG BOARDS
SUPPLY CABINET
SCALE 3:1
RACINE VOCATIONAL SCHOOL

DETAILS OF SUPPLY CABINET. C. H. Niemann, Vocational School, Racine, Wisconsin.

In the part-time school, the boys have made simple notebooks having first made the awls with which to punch the stock. As a large quantity of awls were produced during the period given over to their manufacture, the department will be able to supply industrial arts rooms in the elementary schools with them. These awls will be used in connection with book making in grades five and six and will be serviceable for punching paper stock in small quantities by the students at their desks.

The awls are constructed from a four-inch piece of three-fourths' inch dowel rod, into which a two-and-a-half inch brad is driven into one end, after which the head is ground off, the point being finished with a file. The handle is slightly rounded at the ends to give the tool a better appearance.

A SUPPLY CABINET

C. H. Niemann, Racine Vocational School, Racine, Wis.

It was one of the problems taken up at a conference of drafting instructors of the state of Wisconsin last spring. The writer, who was a member of a committee appointed to study the problem, submitted the design of a cabinet shown on this page as an efficient solution of the problem.

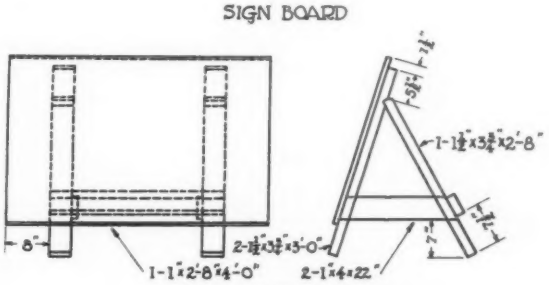
This cabinet is arranged to handle 24 sets of drawing instruments, drawing boards, pencils, pencil pointers, scales, T-squares, and triangles. The arrangement is such that it can be very easily adapted to handle any group of instruments and materials. The rack for the triangular scales, indicated in the drawing, may also be made of wood; but it is quite a difficult job to make the triangular holes accurately.

An advantage of this cabinet is that the instructor may readily check all instruments and materials not in use and lock them up when classes are not in session.

THE SIGN BOARD

Frank W. Dejmek, Algoma, Wis.

The completed sign board shown illustrates a practical shop project. It is a portable sign board, making it easy for the lot owner to move the sign when he wishes to mow the lawn. When the sign needs repainting it can easily be carried into the shop where it is more convenient



DETAILS OF SIGN BOARD.

THE SIGN READY FOR USE.

to do the painting. The drawing shows the construction of the sign board.

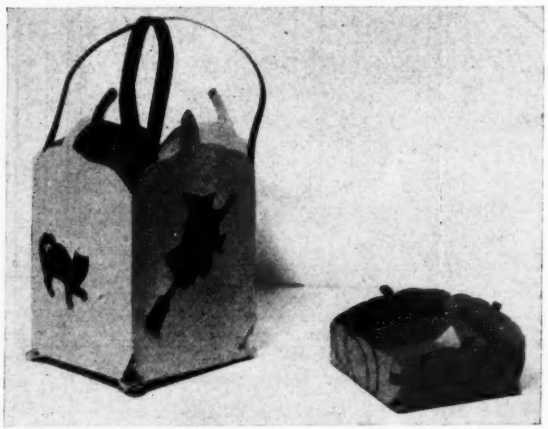
HALLOWE'EN FAVORS

Augusta H. Custer, Geary, Okla.

The nut basket in the accompanying drawing and photograph is made of green and orange crepe paper, according to the following method:

Material: green paper 28" x ¼"; orange paper 7" x 7".

Fold in triangle like figure A. Fold along the line a.a. Trace pumpkin. Cut slits b. With crayola color



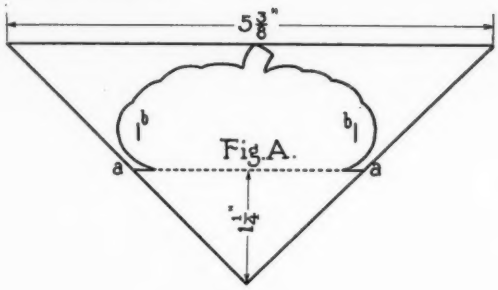
HALLOWE'EN FAVORS.

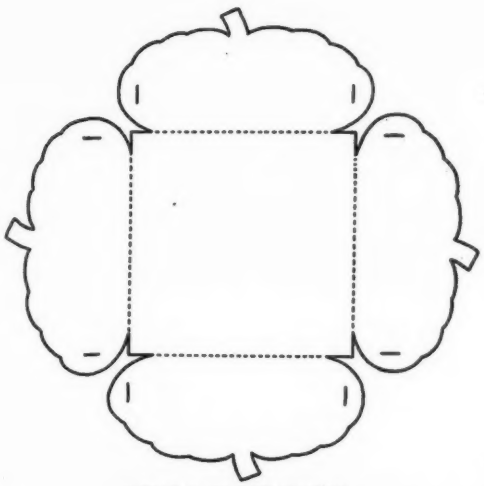
the pumpkin brown and the stem green. Lace the sides together with a strip of green paper and paste ends.

JACK-O-LANTERN

Material: Two pieces of black paper ½" x 9"; one piece of orange paper 9" x 18".

Fold the strip into four equal parts each 2 7/16" wide. This will leave a flap ⅜" wide for pasting the ends





DETAILS OF NUT BASKET.

of the box together. Now fold the bottom as in Figure A. Cut slits b.b. Trace the pumpkin and with crayola color the pumpkin brown and the stem green. Lace the side together with green. Paste on the handles and decorate.

SMALL CLOCKS

George M. Dauth, Reading, Pa.

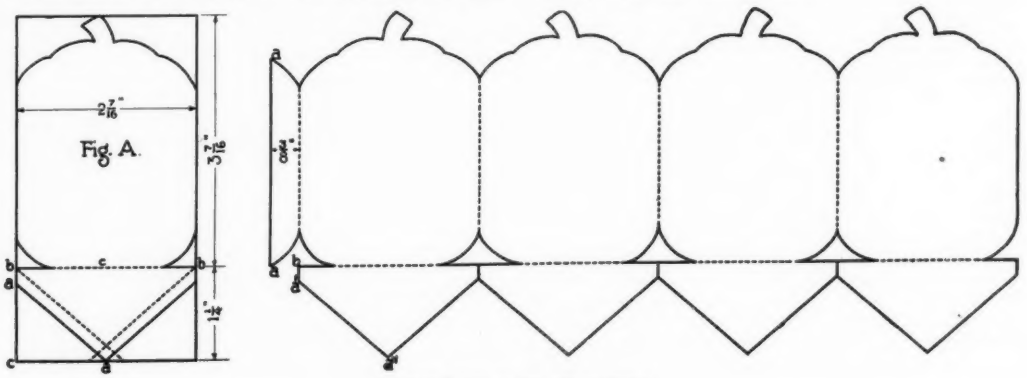
A clock is always a valuable addition to the home equipment, and boys are readily interested in making a clock case for themselves or for a member of their families. The clocks in the illustrations were developed in the writer's classes.

A Grandfather's Clock

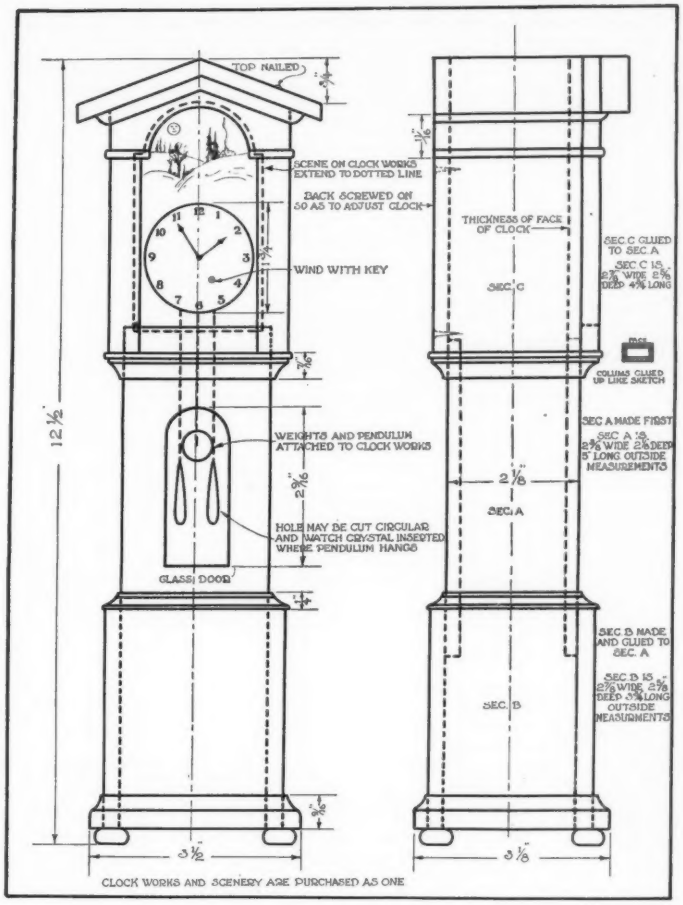
All lumber ¼" thick.

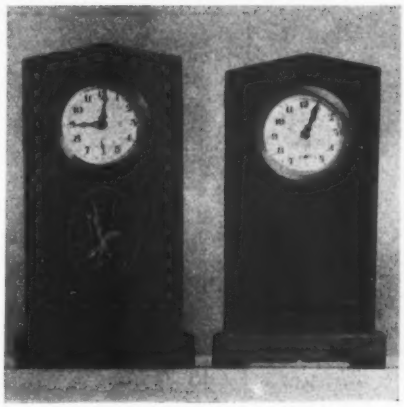
First glue column together, outside dimensions, 2⅛"x2⅜"x8".

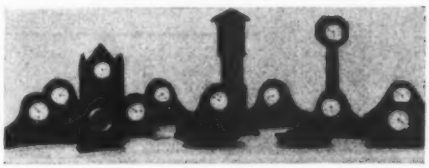
Then glue the base pieces on the column; cut out face piece and glue top pieces on the column, lapping the column ½" at the top. Do not glue the back of the top but screw the same fast so as to permit of adjustment of the clock works. All moulding is made with a small nosing plane. The clock works may be obtained at any variety store for $1.25 each.

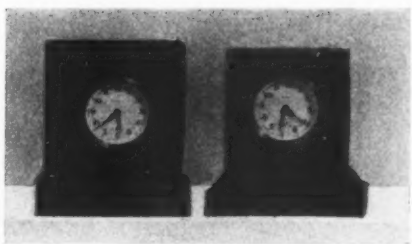


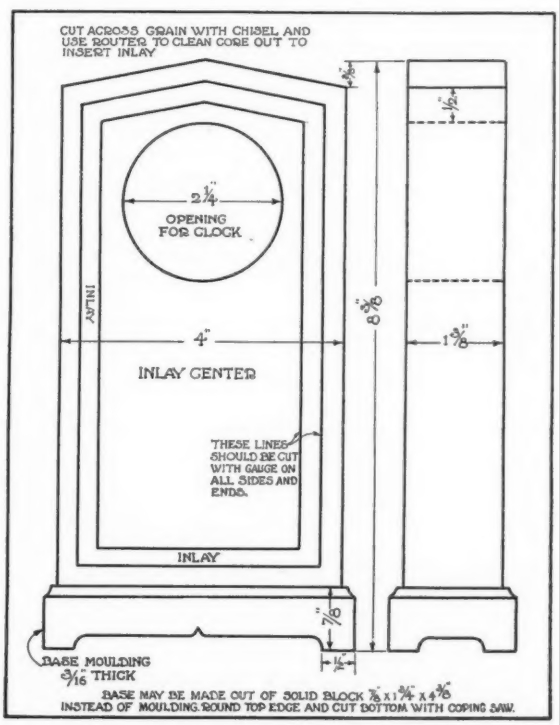
DETAILS OF JACK O'LANTERN.

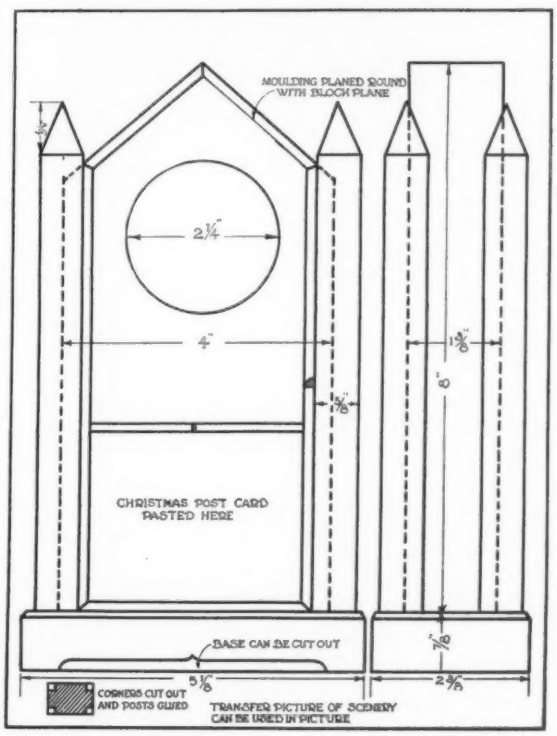

TOP NAILED
SCENE ON CLOCK WORKS EXTEND TO DOTTED LINE
BACK SCREWED ON SO AS TO ADJUST CLOCK
WIND WITH KEY
WEIGHTS AND PENDULUM ATTACHED TO CLOCK WORKS
HOLE MAY BE CUT CIRCULAR AND MATCH CRYSTAL INSERTED WHERE PENDULUM HANGS
GLASS DOOR
12½"
3½"
CLOCK WORKS AND SCENERY ARE PURCHASED AS ONE
THICKNESS OF FACE OF CLOCK
SEC. C
SEC C GLUED TO SEC. A
SEC C IS 2⅞ WIDE 2⅝ DEEP 4⅞ LONG
COLUMN GLUED UP LIKE SKETCH
SEC A MADE FIRST
SEC A IS 2⅞ WIDE 2⅛ DEEP 5" LONG OUTSIDE MEASUREMENTS
2⅛"
SEC. A
SEC B MADE AND GLUED TO SEC. A
SEC B IS 2⅞ WIDE 2⅞ DEEP 3⅞ LONG OUTSIDE MEASUREMENTS
SEC. B
3⅛"



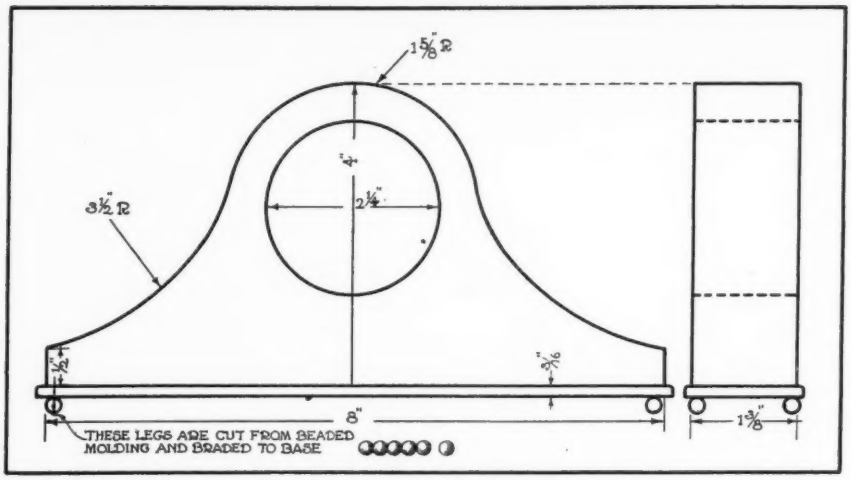





CUT ACROSS GRAIN WITH CHISEL AND USE ROUTER TO CLEAN CORE OUT TO INSERT INLAY
2¼" OPENING FOR CLOCK
INLAY
4"
INLAY CENTER
8⅜"
1⅜"
THESE LINES SHOULD BE CUT WITH GAUGE ON ALL SIDES AND ENDS.
INLAY
⅞"
BASE MOULDING 3/16 THICK
BASE MAY BE MADE OUT OF SOLID BLOCK ⅞" X 1¾" X 4⅜" INSTEAD OF MOULDING ROUND TOP EDGE AND CUT BOTTOM WITH COPING SAW.



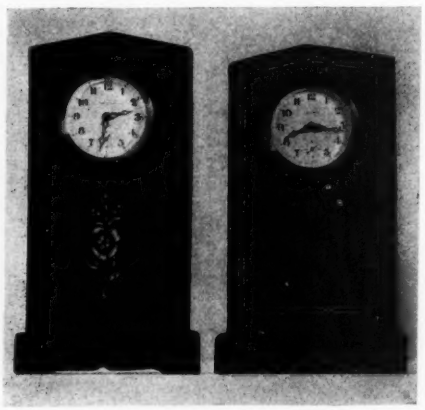
CLOCKS DESIGNED AND MADE IN THE HIGH SCHOOL, READING, PA., BY STUDENTS OF MR. GEO. M. DAUTH.



DETAILS OF A CLOCK CASE.

An Inlaid Clock

A clock showing various types of inlay has been made in considerable numbers by the writer's students. Waste lumber, either red cedar, gum, oak, or maple has been used.



TWO INLAID CLOCK CASES.

The body of the clock measures 1⅜"x4"x8". The top tapers to the side ⅜ of an inch. The hole in which the clock is mounted is 2¼" in diameter and is located by placing the center a distance from the top equal to one-half the width of the block. The width of the inlay is about one-third the space between the opening for the clock and the edge of the block.

The boys are not able to square the blocks up to the exact size given above. For this reason inlays in varying widths are carried in the school shop to allow for the narrower blocks.

WHAT ABOUT SKILLED MACHINISTS?

The question of a shortage of skilled machinists is discussed by A. W. Forbes, an employer in a recent number of the American Machinist. There is no shortage of machinists, he contends, but there is a decided shortage in really skilled men.

Mr. Forbes says that in employing machinists and mentioning the kind of man wanted he has been confronted with the remark. "You do not want a machinist. You want a professor." While he holds that under the present circumstances the exactions may be too high, he does believe that higher standards will and must be exacted. He says:

"An ideal machinist would combine the knowledge and ability of the machinist as ordinarily understood with the occupations of mechanical engineer and production manager. I should like to hire a few of that kind at machinist's wages, but it is useless to expect to find one looking for a job as machinist. Yet we will persist in wanting such, even though we know we cannot find them. Such machinists should be the aim of apprenticeship, even though we know that the bulk of apprentices can never approach such accomplishments, and that if any do they will be more profitable to their employer if they give up their trade and become executives."

THE "WHITE COLLAR" JOB TENDENCY

The Wisconsin Apprentice does not subscribe to the belief that there is a strong tendency on the part of young men to "flock into white collar jobs." It says:

"Prior to the time young people leave school to go to work they doubtless have ideas of their own regarding their choice of occupations. But what they hoped for and what they actually get in the way of jobs are two things usually widely separated. Most of them are in the positions they hold simply because they happened to have been on hand when the vacancy occurred.

"Theoretically everyone has his choice of an occupation, but actually few exercise their privilege to make a choice. So far as the trades are concerned, boys do not purposely side-step apprenticeships. There is no reason why they should since the apprentice's lot is an easier one than falls to the average working boy of apprentice's age.

"If employers in any community are having difficulty in securing apprentices let them make their wants known to prospective apprentices. Let them make an offer—a genuine one. That boys can be induced to take up apprenticeship is borne out by the fact that in some places in the state there are waiting lists of those who want to become apprentices. And this in trades not the most desirable from the prospective apprentice's standpoint and not the highest paid either."

STATUS OF PART-TIME SCHOOL

"To develop effective vocational value in part-time schools, we must improve our thinking with regard to part-time education and realize that to all part-time pupils, the services of the placement office are peculiarly valuable," said Frank M. Leavitt, Associate Superintendent, Pittsburgh Public Schools, in an address before the National Vocational Guidance Association.

Continuing he stated: "The amount and nature of the vocational guidance which should be given in part-time schools will be obvious when the real significance of the vocational guidance association and the exact nature of the part-time schools are clearly observed.

"Vocational guidance contemplates a thorough-going revision of educational administration, on the part of the schools, and the development of a more intelligent interest in the education of junior employees, on the part of employers. Its fundamental object is to make it possible

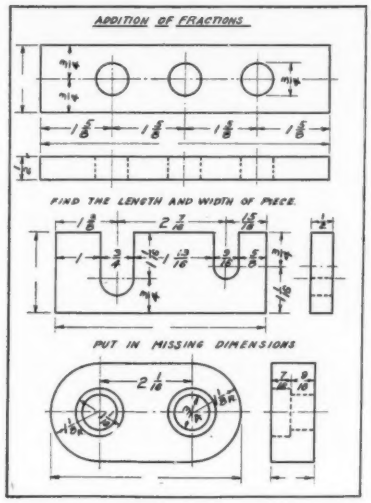


FIGURE 1.

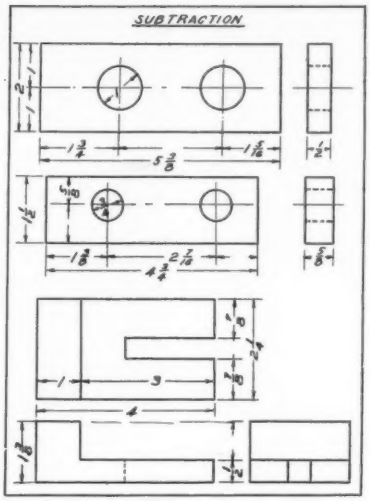


FIGURE 2.

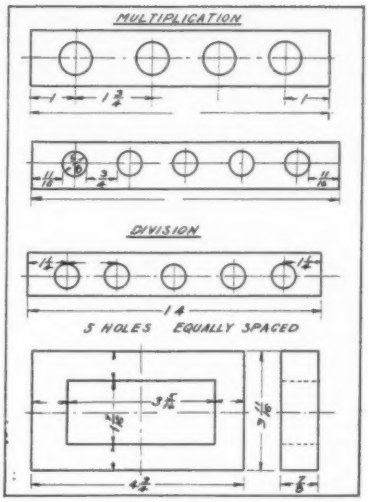


FIGURE 3.

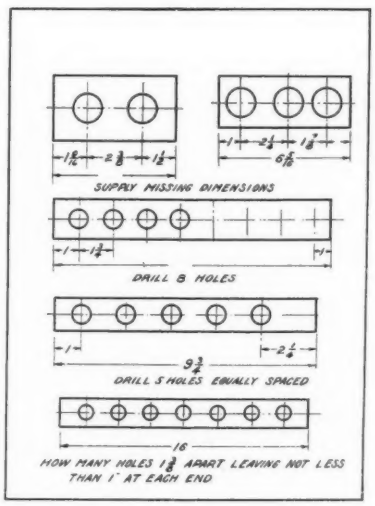

SUPPLY MISSING DIMENSIONS
DRILL 8 HOLES
DRILL 5 HOLES EQUALLY SPACED
HOW MANY HOLES 1⅜ APART LEAVING NOT LESS THAN 1" AT EACH END

FIGURE 4.

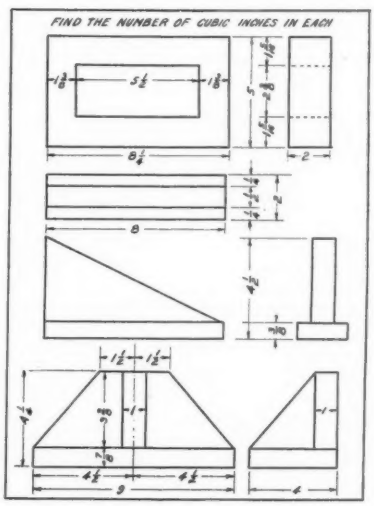


FIGURE 5.

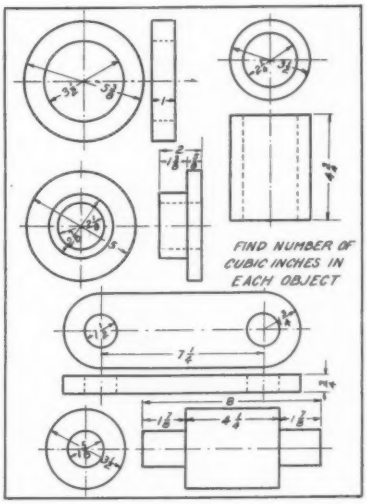


FIGURE 6.

for society to accomplish the American principle of universal education. Universal education implies appropriate education. Appropriate education demands diversified educational offerings. Intelligent selection can be made only under the guidance of people who know the schools and the occupational conditions of junior employees.

"The status of part-time education is chaotic with regard to objectives and standards. All part-time schools are either part-time cooperative schools or part-time continuation schools; the difference between these two types being fundamental. Part-time cooperative education is possible only when the schools and the employers are working together. Part-time continuation school education is founded on the assumption that children have had little general education.

MATHEMATICS IN THE DRAFTING ROOM

W. W. Sturtevant, South High School, Minneapolis, Minnesota

When one considers the necessity of a knowledge of mathematics for the draftsman, it seems strange that a little more time is not devoted to mathematics in the drawing courses in high schools.

The most elementary work in the drawing room requires the ability to solve problems in fractions with accuracy and speed, and if a boy is to entertain the slightest hope of advancing from tracer to detailer, or to a better position, he must be quick at figures.

It is scarcely safe to assume that the work done in the grade schools, good as it is, has produced the accuracy and speed that should be expected of a high school boy who expects to succeed in technical work.

A short test will probably convince one who doubts this statement.

Give the average class of high school boys a test requiring only the ability to perform simple processes, the understanding of fractions, and the use of a little reasoning power, and the results will be surprising.

Usually there is an unwarranted loss of time, an astonishing number of errors, and in many cases a lack of confidence that reveals itself by numerous questions.

The greater number of the boys tested doubtless know how to add, subtract, multiply, and divide, but probably waste a good deal of time finding out how many 1⅞" spaces there are in 18¾" or the weight of a cast iron flange, when they are given the dimensions.

Vocational Courses. New vocational courses have been introduced in the East High School, Minneapolis, Minn., upon the recommendation of Supt. W. F. Webster. Among the courses provided are practical arts, bookbinding, carpentry and joinery, tailoring, and commercial subjects.

INDUSTRIAL ARTS COURSE AT THE THREE RIVERS HIGH SCHOOL

F. W. Crawford

For years past the Fairbanks Morse Company, in Three Rivers, has maintained a four-year apprentice course for young men which led to a certificate as a master mechanic in their shops and steady employment there. During the war boys could earn so much more as workers than as students in the shops that the apprentice course was discontinued.

Many boys left Three Rivers high school to take up the apprentice course previous to the war, because they wanted to become machinists and felt that our high school had nothing of practical benefit for them. Our industrial-arts course was designed to provide training for the boy who formerly left school to take up the machinist's trade as an apprentice. When he finishes with us he will have a high school diploma and an apprentice course certificate from the Fairbanks Morse Company. Both the public schools and the company are gainers by this arrangement. The company eliminates their old shop school and its expense, and the demand for rooms and equipment. The public school answers the boys' demand for a practical course more fully and cuts down its school mortality very materially.

Fairbanks Morse Company has donated to the high school about $10,000 worth of machines and equipment for the school machine shop. This was an outright gift with no strings attached. In addition the company furnishes materials and supplies to the school at cost. As the boys become proficient on the machines they turn out work which is being bought from us by the company at their cost figures for that kind of work. This enables the school to buy materials at cost and to sell the finished product for enough to pay for the materials at least. No attempt is being made to make the course self-supporting, but the sale of the finished product aids materially in lessening the cost of the course to the school.

As planned, the industrial course consists of four years' of work. The ninth grade work differs little from the ordinary course followed by a boy who will not go to college. The subjects pursued in the ninth year are english, general science, mechanical drawing and manual training. The manual training work is wood shop.

The tenth year the boys get two and a half hours' work daily on the machines in the school machine shop. The subjects taken include shop practice, shop mathematics, shop drawing and English.

The eleventh year he continues the work of the preceding year with the addition of United States history and civics.

His last year he spends one-half day in school and five days in the Fairbanks Morse Shop each week. In school, shop practice, show drawing, English and a combination chemistry and physics course will be completed.

While a student finishing this course will not have the required fifteen units to answer college entrance requirements, he will have completed a four years' course in high school and will receive an industrial arts course diploma. During his senior year at the company's shops he will work as any other machinist on production and will receive the regular wage paid for that kind of work. This arrangement permits a boy to become self-supporting at the end of his junior year and still remain in school to complete his course.

MACHINE SHOP DEPARTMENT, INDUSTRIAL ARTS SHOP AT THREE RIVERS, MICHIGAN.

No course in high school has stimulated the interest of the men of the school district as this one has. Many have visited the school shop who never were in the building before. The boys are deeply interested in the work and three boys left regular employment in the shops to reenter school for this course. The course promises to outgrow its present quarters very soon and a special shop will have to be built to accommodate the boys.

Mr. K. G. Smith, state supervisor of industrial education, has assisted us throughout in planning the course, selecting the machines, and laying out the shop. The work receives Smith-Hughes aid.

WOODWORKING DEPARTMENT OF THE INDUSTRIAL ARTS SHOP AT THREE RIVERS, MICHIGAN.

FLEXIBLE ANCHORAGE SYSTEM FOR SCHOOL SHOPS

Installation in the Manual Training Department of the Passaic Memorial School

J. H. Constantine, Director of Industrial Education, Passaic, New Jersey

During the years in which the writer has been engaged in both engineering construction and vocational education work in schools, the need for some standard form of reliable anchorage in ceilings, floors, and side walls for the purpose of fastening motors, line shafting hangers, machinery, piping, etc., has been constantly brought before him.

Modern school buildings as well as industrial buildings differ greatly in form of construction. In recent years,

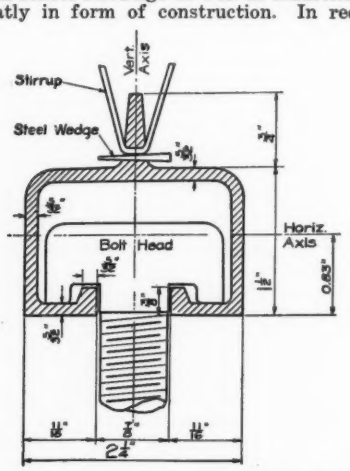


FIG. 1. CROSS SECTION OF BOX RAIL INSERT.

however, the trend of modern engineering practice is to provide a fully fireproof structure. This means a reinforced concrete building or steel frame with reinforced concrete slabs and concrete fireproofing on steel members.

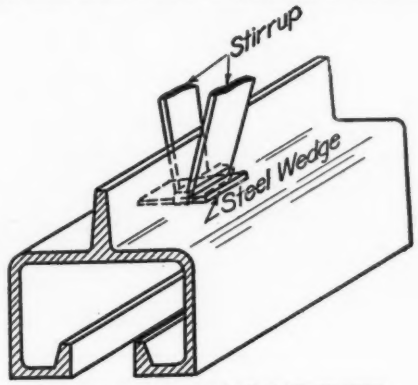


FIG. 1A. DETAIL OF BOX RAIL INSERT.

In school buildings it is usually a difficult problem in the machine shop, laboratories and gymnasium to find a secure and flexible anchorage for apparatus.

The spotting of individual inserts set flush with the ceiling and embedded in concrete floor slabs was the first step to relieve this condition. They are not, however, entirely dependable in carrying capacity and never seem to be placed in the right place. This means some kind of bridging on the ceiling in order to get the anchorage and flexibility necessary.

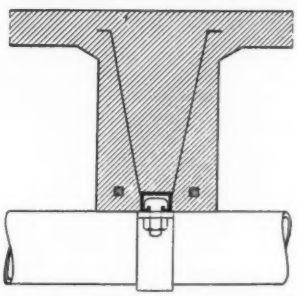


FIG. 2. BOX RAIL INSERT USED AS PIPE HANGER.

When existing equipment or transmission lines must be changed, considerable labor, careful measurements, bridging and drilling are necessary where no inserts are provided or where individual inserts are used.

These difficulties have been greatly relieved if not entirely eliminated in recent years by the use of the long continuous box rail insert (Fig. 1 shows one type of these inserts in cross section).

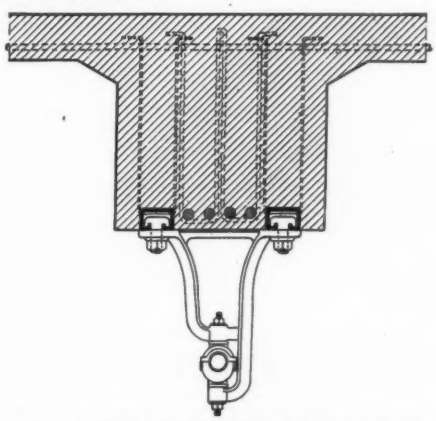


FIG. 3. INSERTS USED FOR CARRYING SHAFT HANGER.

FIG. 4. CEILING OF SHOP IN THE PASSAIC MEMORIAL SCHOOL, SHOWING INSERTS FLUSH WITH PLASTER.

These long inserts running continuously in parallel rows over the entire ceiling, make it possible to secure the required anchorage at any point desired, usually without any bridging. These inserts are heavy rolled sections and are designed to take any load within practical requirements.

It is a source of pleasure as well as a great convenience to know that whenever the necessity arises for installing additional equipment; rearranging existing machinery, and relocating motors these changes can be made quickly without any additional material (and usually without the aid of expert millwrights). This is also true in reference to the placing of line shafting or counter-shafting. Box rail inserts of this kind should be incorporated in the building design, especially in manual training departments for "safety first" sake as well as the economy and convenience they afford. (Figs. 2 and 3 illustrates some of their uses.)

Figure 4 illustrates the method of installation used in the Passaic Memorial School. This cut shows a corner of the manual training department. The long continuous inserts were set flush with ceiling and run in parallel lines about 7′ 0″ center to center from wall to wall. Since this school is in course of construction, the photograph was taken after the scratch coat of plaster had been applied. The rails were embedded in the reinforced concrete floor slab, which is of the Republic long span flat slab design. The box rail acts as a reinforcing bar as well as a long continuous insert. This point may be economically utilized by designers and engineers, and the initial cost of box rails thereby reduced.

For installation or changing of equipment, a flat or monkey wrench and six foot rule are the only tools necessary. Lining up and adjusting of overhead line shafting can be carried out quickly and with little labor cost. Where heavy castings have to be handled an I Beam can be clipped to box rails or hook bolt used for a chain hoist.

The long continuous box rail is a great advance in anchorage practice, not only for manual training departments in schools but in practically all departments of industrial plants.

Research Board Organized. A board of research for the printing industry has recently been organized at the Oswego State Normal School, Oswego, N. Y. The immediate aim of the board is the beginning of a study of the printing industry. The work will be carried on by means of experiments tried out in the printing shops and these will be worked out through the cooperation of an educational director and the teachers of printing in the schools. The board is composed of the following officers: Mr. Joseph C. Park, Oswego, N. Y., president; Mr. J. D. Rudolph, Oswego, secretary-treasurer; Mr. G. C. Morehart, Syracuse University, educational director.

Class in Sign Writing. The East Side Evening High School of Manhattan Borough, New York, is offering free courses in sign writing and show card writing, printing and presswork for the benefit of those employed in these trades. The work consists of both theory and practice and classes are held four evenings each week.

NOW ARE THERE ANY QUESTIONS ?

Industrial Arts Tests

475. The reply in the September issue to D. C. M.'s question concerning standard tests for shop work has brought another set of tests. This is the Patrick Industrial Arts Test, prepared by Mr. Charles D. Patrick of the Bayonne, N. J., schools, for use in grades 7, 8, and 9. It is a diversified activities test of the selective type and covers processes, materials, and related information in woodwork, concrete, electricity, printing, bench metal and sheet metal wok. The test is sold by the author ($3.50 per hundred) at 44 Vista Ave., Elizabeth, N. J.

Colonial Banjo Clock

Q. 478. Can you tell me where I can obtain drawings of Banjo clocks? Also information on the works, the painted glass, etc.—W. E. W.

Can any reader of the INDUSTRIAL-ARTS MAGAZINE suggest a source from which this inquirer can obtain drawings of Colonial Banjo clocks? Information will be appreciated by the editor and the inquirer.

Polychrome on Turned Lamp

Q. 479. I am planning on making a turned floor lamp and for finish I want polychrome. What kind of wood should I use to have the best results when finished? What kind of polychrome should I use?

A. The best kind of wood to be used for a lamp with polychrome finish is any close grained hard wood such as birch.

The article on Polychrome Finish, which appeared in the December, 1923, issue of the INDUSTRIAL-ARTS MAGAZINE will give information on the finish for the lamp.—Ralph G. Waring.

Finishing a Gym Floor

Q. 480. Please tell me the method used in finishing a new hardwood floor in a gymnasium. The floor has nothing but the black lines painted on for basket ball.—G. B. J.

A. The State Board of Health of Maine may have something to say about the treatment to be given your gymnasium floors and should be consulted. In New York state it is mandatory that all wooden floors in public schools be scrubbed twice a year with hot water and soap, dried and given a hot coat of Standard Oil Company's light floor oil. It is believed that this abates the dust nuisance, although there is considerable complaint, both on the part of the teachers and pupils, due to the soiling of such clothes as may come in contact with the floor.

It has been my observation, however, that the same and better results can be accomplished on new floors by surfacing them carefully with electric, or gasoline-driven, sanding machines, applying a coat of natural colored Silex filler, made water thin and carefully rubbed into the wood. This may be objected to on the part of so-called practical painters because of the fact that pine and maple flooring apparently have no pores to fill, for which reason this filling operation is apparently unnecessary. But it is not generally taken into account that the very considerable porosity of these woods will absorb, in unequal portions, large amounts of expensive varnish with less durable results than can be secured through the use of a coat of filler and a coat of floor varnish rather than two coats of varnish. Directly after the filler coat has hardened, allowing not less than 48 hours, the filler striping material for hand ball and basket ball courts should be applied. For this purpose I find that the black spirit soluble stains put out by the S. C. Johnson Co., are quite practical.

Stripe coats should be applied with a fitch or bear brush, rather than the stiffer black China bristle brushes, since the former will lay on a full bodied stripe in one application. The stripe coat should dry over night. The floor should be carefully swept with a hair broom and the varnishing started on the side opposite the exit, covering not more than eight or ten boards at a time, back and forth over the floor. On a job of this kind it is best to have three men, who are good varnishers and accustomed to working with each other, if a good job is to be secured.

One coat applied at this time of year and allowed from seven to ten days' hardening should give splendid service until the Christmas holidays, when the floor should be carefully washed with sponges and Ivory soap by hand; under no circumstances should it be mopped. After washing, the floor should dry over night and should then be varnished with a high grade material, like Pratt & Lambert No. 61 floor varnish, and allowed to dry during the holidays before using. If at any time the floor is waxed for dancing, it will be necessary to use some material like Oakite in place of the milder Ivory soap in order to effectually remove the last traces of wax before revarnishing, otherwise the varnish will not dry upon application. With first class care every six months, this floor should keep in high grade condition.—Ralph G. Waring.

NEW BOOKS.

Freehand Drafting

Anthony E. Zipprich. Cloth, octavo, 131 pages. Price, $1.60. D. Van Nostrand Co., New York.

Too many draftsmen stick so closely to the use of instruments that they are unable to use the graphic language understandably without the use of straight-edge, ruling pen and compass. They are lost when they are asked to make a rapid field sketch of a machinery part or a picture drawing which a layman can grasp. The present book presents those special principles, conventions, and methods of mechanical drafting which are especially applicable to freehand drawing. It assumes that the student or draftsman is familiar with the fundamental principles of drafting and for the reason emphasizes rather the special application of these principles to drawing without instruments and affords a comprehensive series of practice exercises.

The chapters on isometric drawing and on shaded sketches are quite masterly and decidedly the most useful. The draftsman who can use the simple rules and methods here described has at his command the most useful and sure tool for visualization which he can acquire. The book is splendidly ilustrated.

Job Sheets in Home Mechanics

F. E. Tustison. Forty sheets, 39 jobs. Price, 64 cents. The Bruce Publishing Company, Milwaukee, Wis.

This group of job sheets has been developed by a pioneer in the field of home mechanics and forms a minimum course in nine fields or trades. It includes jobs in wood work, wood finishing, sheet metal, bench metal, plumbing, electricity, concrete, and unclassified home jobs. The sheets are a decided advance in content, form, illustration, and teachability over the common form of home made job sheet. Materials and tools are clearly specified and difficult steps are illustrated by means of photographs and diagrams. Each job is motivated and ample test questions are appended. The sheets fill a real need for carefully graded and typical home mechanics work which affords a wide variety of experience at low cost, and which is genuinely prevocational in purpose.

Industrial Electricity

By C. L. Dawes. Cloth, octavo, 371 pages. Price, $2.25. McGraw Hill Book Co., New York, N. Y.

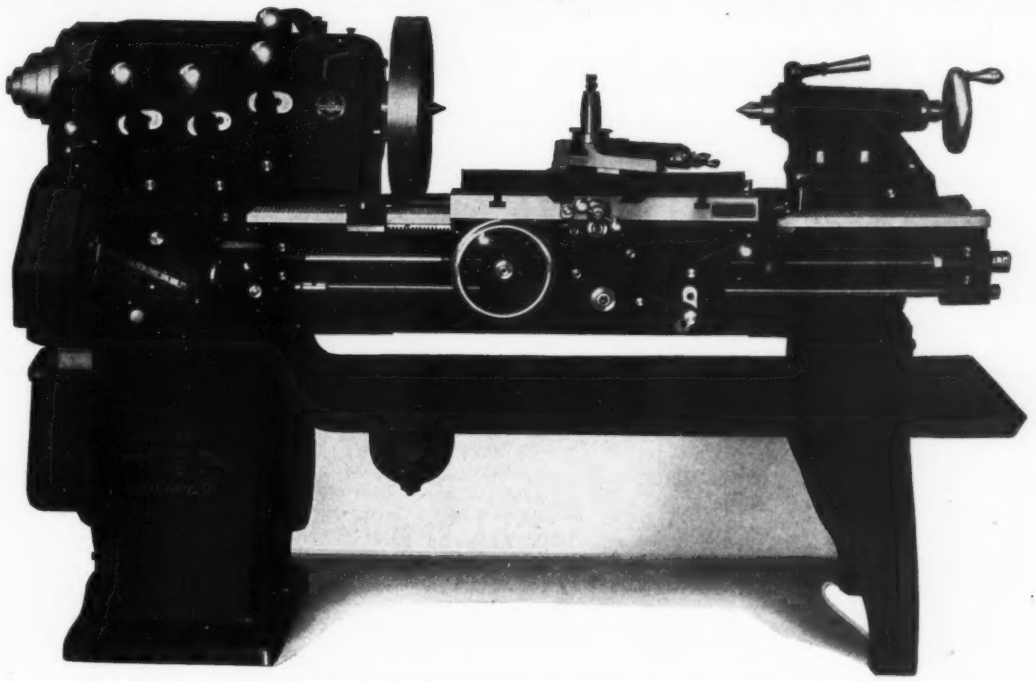
This book presents a very thorough statement of the fundamental principles of magnetism and electricity as applied to simple electrical apparatus used for commercial purposes. It is intended to ground the student in the theory and mathematics of the subject and to afford a view of the uses to which these principles are put by the electrical engineer in the design and operation of typical machines. Direct circuits only are considered—alternating currents will be taken in a second volume.

The arrangement is logical and the treatment, while technical, is simple enough for students of high school or trade school grade. The problems are rather complete and are directed toward developing independent reasoning on the part of the student in applying theories and rules to practical work. The book will make an excellent text and reference work to accompany a strong laboratory and shop course.

Short Unit Courses for Machinists. Series X, No. 2; issued by the Kansas State Teachers' College, Pittsburg, Kans. It suggests a series of short unit courses which may be offered to machinists and apprentices in evening courses. The work is divided into two sections, namely, shop work and related work and is given in three-hour shop periods once a week.

Sunbury General Shop Accomplishment Test. Wayne E. Steiner and W. A. Geesey. Sunbury, Pa. The sheets contain both the questions and the answers for the tests.

Silent - Smooth - Powerful



14" x 6' Monarch 8 Speed Self-Contained Motor Drive Lathe With Chrome Nickel Steel Helical Gears and Ball Bearings in Headstock. Motor and All Wiring Inside Cabinet Leg.

These MONARCH lathes are the very last word in design and efficiency and adaptability for Vocational School use. The helical gears in the headstock are absolutely noiseless. Four large ball radial and six ball thrust bearings in the headstock eliminate friction and prevent wear.

The motor is mounted inside the cabinet leg where it is protected from oil and dirt, and all electrical wiring and connections can be housed inside the cabinet leg. Drive is through endless belt with adjustable ball bearing idler pulley.

The only noise made by the helical geared MONARCH lathe is the swishing of the oil in the headstock. Operation of the entire lathe is fool proof. If desired a heavy glass cover plate can be put on top of headstock making the inside visible.

MONARCH lathes are standard equipment in many of the best production shops and tool rooms. Our large production enables us to offer these lathes as the very finest lathes ever offered for Vocational School use and at prices within the appropriation limit of those schools desiring good machine shop equipment.

We will gladly send you catalogue and special bulletin describing these new lathes.

America's Largest Builder of High Grade Lathes

The Monarch Machine Tool Company

404 OAK STREET SIDNEY, OHIO.

COLUMBIAN
UNIVERSAL VISES

Will hold work at any angle and are quick-acting in every position

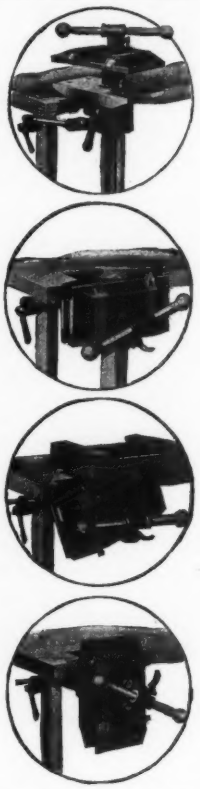
They are used by cabinet and patternmakers in woodworking shops everywhere.
Students should learn to use these vises which they will find in industrial plants after leaving school.
Every Manual Training Instructor's Bench should be equipped with Columbian Quick-Acting Universal Vises.

Made with two sizes Jaws, 7X16 or 6X12 inches. Either size made to open 12, 16 or 20 inches

Jaws made in two sizes, 7x16 or 6x12 inches

Showing Various Positions

1. The entire vise swung around so that the jaws are horizontal. The two hand-nuts lock the vise rigidly in any desired position.
2. Using the dogs to hold a curved segment. A light tap on the bottom of the dog brings it up into place.
3. With the vise swung at an angle, work can conveniently be held flat on the bench.
4. The Columbian Universal Vise rotated so that the ends of the jaws are above the bench level.



THE COLUMBIAN HARDWARE CO.
CLEVELAND, OHIO.

NEWS AND NOTES

Offer Courses for Apprentices. The evening high schools of New York City are this year offering several courses for apprentices in the building trades. The courses have the approval of the labor unions and employers, through an arrangement perfected last year between the school board and the apprenticeship commission of the Building Trades Congress.

The branches of the building trades for apprenticeship training which will be in operation during the season 1924-1925 are carpentry (Harlem trade, Stuyvesant, Long Island City, Bushwick, Brooklyn Tech., Curtis and Jamaica); painters and decorators (Murray Hill; electricians (Harlem, Murray Hill, E. S. 95, Manhattan; Bushwick, E. S. 5, Brooklyn).

During the season other building trades will include brick-laying and plastering. Apprentices in the photo-engraving and lithographing industries are also required to attend evening schools by the organization connected with their respective trades.

Household Mechanics Course. The school board at Lansing, Mich., recently installed equipment for a course in household mechanics.

Health Poster Contest. As an aid in conducting a milk-for-health campaign, the U. S. Department of Agriculture has just announced the publication of prize-winning designs in a poster contest participated in by children in the city and rural schools of the country. The posters were made in connection with programs carried on by the several communities in which the children live, with the cooperation of the state agricultural college and of the Bureau of Dairying of the Federal Department.

The aim of the milk program is to encourage an intelligent use of milk for improving health and for reducing undernourishment. The making of the posters was a helpful feature and the reproductions have been published in order that they may prove useful as suggestions to those planning similar programs. Copies of the publication are available by writing to the Department of Agriculture and mentioning Miscellaneous Circular No. 21.

Civil Service Examination. The Civil Service Commission has announced an open competitive examination to be held October 22 and December 10th, throughout the country. The examination is to fill vacancies in the Indian service, at an entrance salary of $1,500 a year. Quarters, heat and light are furnished free of cost.

Applicants for positions must be graduates of a four-year college course in home economics, and must have had at least two years' experience in teaching foods, clothing, and household management. Applicants will be rated on home economics, education, training and experience.

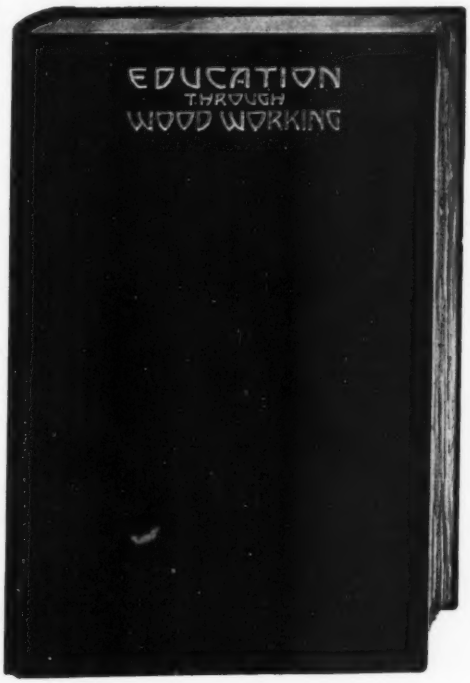
Information and blanks may be obtained from the U. S. Civil Service Commission, Washington, D. C., or from the examiners in the postoffices or custom-houses in any city.

Exhibit Prize-Winning Posters. Hygeia, a monthly magazine published by the American Medical Association, held an interesting poster contest during the early spring months which resulted in the presentation of 4,492 posters from high school students in all parts of the country. The Association has placed 1,000 of the best posters on exhibition at its office building, 535 N. Dearborn St., Chicago, so that all who are interested in health or art matters may view them any day except Saturday. The design awarded first prize has been reproduced for use as the cover page of the August issue.

The number of posters submitted in the contest was said to have exceeded the number submitted in any similar affair of the kind. Most significant, however, was the fact that the posters exhibited a high quality in design and workmanship. The originality of conception shown in the selection of health slogans, the ingenuity and effectiveness of the devices, and the artistic ability displayed in line and color were conceded to be remarkable. Another important deduction was the fact that the students in the high schools are thinking in terms of health and this should in the end make for efficiency and happiness. It is felt that students whose knowledge of health habits is sane, sound and definite are cultivating health habits, and are obtaining an accurate knowledge of health, which means the improvement of the nation as a whole.

Fire Prevention Poster Contest. The Committee on Fire Prevention Week of the National Fire Protection Association, Boston, Mass., has announced an international contest (United States and Canada) open to all, for the best designed posters for the 1925 Fire Prevention Week campaign. Three prizes, donated by Mr. E. L. Sanders of

(Continued on Page 25a)



EDUCATION
THROUGH WOOD WORKING
contains 354 pages, gilded at top, with 150 illustrations, numerous charts, drawings, stock bills, diagrams, etc. The book is 6½ x 9¾ inches in size and is bound in Levant pattern leather, with the lettering stamped in pure gold.

In fact no expense has been spared to make the physical beauty of the book worthy of the unusual quality of its text contents.

EDUCATION
THROUGH
WOOD WORKING

To the teachers who entered our prize Essay Contest a year ago, we announce that we will send immediately, a complimentary copy of the book "Education Through Wood Working." This volume contains the prize winning essays together with a compilation of the experiences and observations of all the contestants as teachers of the subject of woodworking. In addition it contains valuable information on the operation of woodworking machines and construction specifications for class room study. You will welcome this book as you have never welcomed another. The book is yours in a very near sense for you helped make it possible.

To all those who did not participate in the contest, and who desire a copy of the book for their class work or library, there will be a charge of $2.50 per copy which should accompany the order. This amount does not cover the cost of printing and mailing. The edition outside of those copies distributed to the contestants is small and orders for the book will be filled as they are received. We advise you to get your order in early if you desire a copy of this wonderful book.

AMERICAN WOOD WORKING MACHINERY COMPANY

Educational Department

ROCHESTER, N. Y.

New Van Nostrand Books

Published Sept. 1st

FREE HAND DRAFTING

by

ANTHONY E. ZIPPRICH

Instructor, Mechanics Institute, New York.
With an Introduction by Carl L. Svensen,
Professor of Engineering Drawing,
Ohio State University.

Freehand Drafting is becoming of increased importance in the drawing curriculum. It is being taught as a distinct course in many schools.

It teaches independence from instruments and thus is invaluable to salesmen — to executives — to engineers in aiding the prompt graphic presentation of an idea of a machine.

This book is really the first text of its kind. It includes about 170 problems and exercises, besides explanatory plates so arranged that a selection of problems taught and studied in sequence should result in the student acquiring a satisfactory ability to sketch industrial objects and learn the fundamentals of Machine Drawing.

A practical text from the pen of a man who has both taught and worked in the shop. A sound book for trade and industrial school. A book the boy can understand and the teacher enjoy.

141 Pages **71 Full Page Plates**

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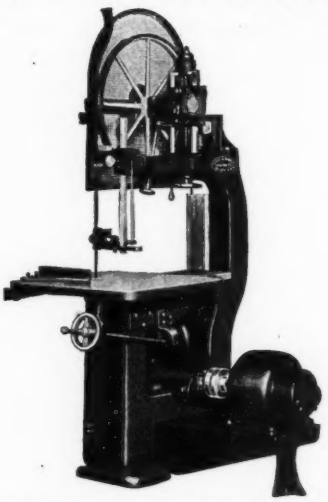
NEW TYPE BANDSAWS



The New Model No. 185 and No. 186 Bandsaws represent the latest development in machines of this type. Built in two sizes, 30" and 36" wheels, with ball bearings or babbitted bearings, safety guards that are designed and built as a part of the machine, and can be furnished for belt or direct motor drive.

Write for literature describing these machines, also catalogue showing full line of wood working machinery for Manual Training Schools.

HALL & BROWN WOOD WORKING MACHINE CO.

Broadway, Tyler, Ninth Streets,
ST. LOUIS, U. S. A.

Do You Sand Work Like This in Your School Shop?

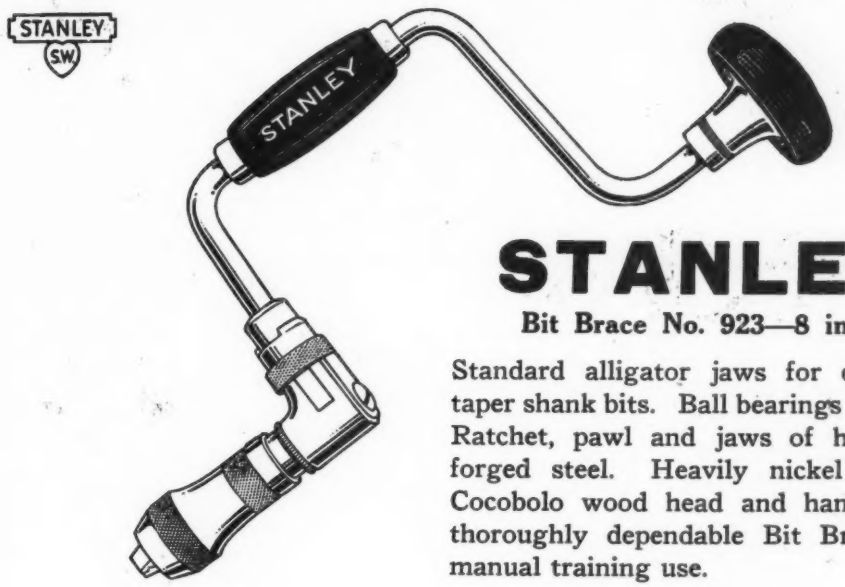
The picture above illustrates a few of the many shapes which can be belt-sanded to advantage on the Mattison Hand Block Sander. Every woodworking establishment of any size operates at least one hand block sander.

Familiarize your students with belt sanding machine methods as they actually exist in the factories by having them use a Mattison hand-block sander for finishing large flat surfaces and moulded shapes, as well as small pieces and built up cases.

MATTISON MACHINE WORKS

Rockford, Illinois, U. S. A.

CHICAGO GREENSBORO, N. C. NEW YORK SAN FRANCISCO



STANLEY

Bit Brace No. 923—8 inch

Standard alligator jaws for ordinary taper shank bits. Ball bearings in head. Ratchet, pawl and jaws of hardened forged steel. Heavily nickel plated. Cocobolo wood head and handle. A thoroughly dependable Bit Brace for manual training use.

STANLEY
NEW BRITAIN, CONN., U.S.A.
THE STANLEY WORKS — THE STANLEY RULE & LEVEL PLANT

(Continued from Page 22a)

Worcester, are offered as follows: First prize, $200; second prize, $100, and third prize, $50.

The designs will be selected by a committee composed of nationally known men. Posters submitted must be in the hands of the committee not later than December 15, 1924, and should be addressed to the Poster Contest Committee, National Fire Protection Association, 40 Central St., Boston, Mass.

Opportunity Classes. Two opportunity classes for retarded children have been established in the junior high school at Ware, Mass.

Vocational School. A vocational school has been opened at Hamtramck, Mich., with courses in manual arts and subjects adapted to part-time pupils.

Exhibit of Interior Decorative Art. The Art-in-Trades Club of New York City has announced its third annual exhibit of interior decorative art, to be held October 20 to November 13, at the Waldorf-Astoria Hotel. The exhibit will comprise a varied and interesting display of room interiors in many different aspects. Mr. George E. Clark is chairman of the publicity committee in charge of the exhibit..

Industrial Arts Boys Complete School Work. C. W. Handman, business manager of the Cincinnati schools, has expressed his pleasure in the work turned out by the industrial arts pupils this summer. The boys remodeled the lighting in the Sherman, Columbian, Sands, Bloom, Horace Mann and Dyer schools, and also constructed a great variety of furniture for the Withrow high school at a cost of $4,493. The amount expended for the latter is $2,000 less than the lowest bid obtainable from local manufacturers. The state inspection bureau stated that the electrical installation job performed by the boys was one of the best open conduit jobs in the city.

Progress of Vocational Education in Alabama. An interesting report of the progress of vocational education in Alabama for the year ending June 30, 1924, has been presented to the state vocational department by Mr. John W. Abercombie. It deals with information bearing on work activities of boys and girls enrolled in all-day and part-time classes and of men and women in part-time and evening classes.

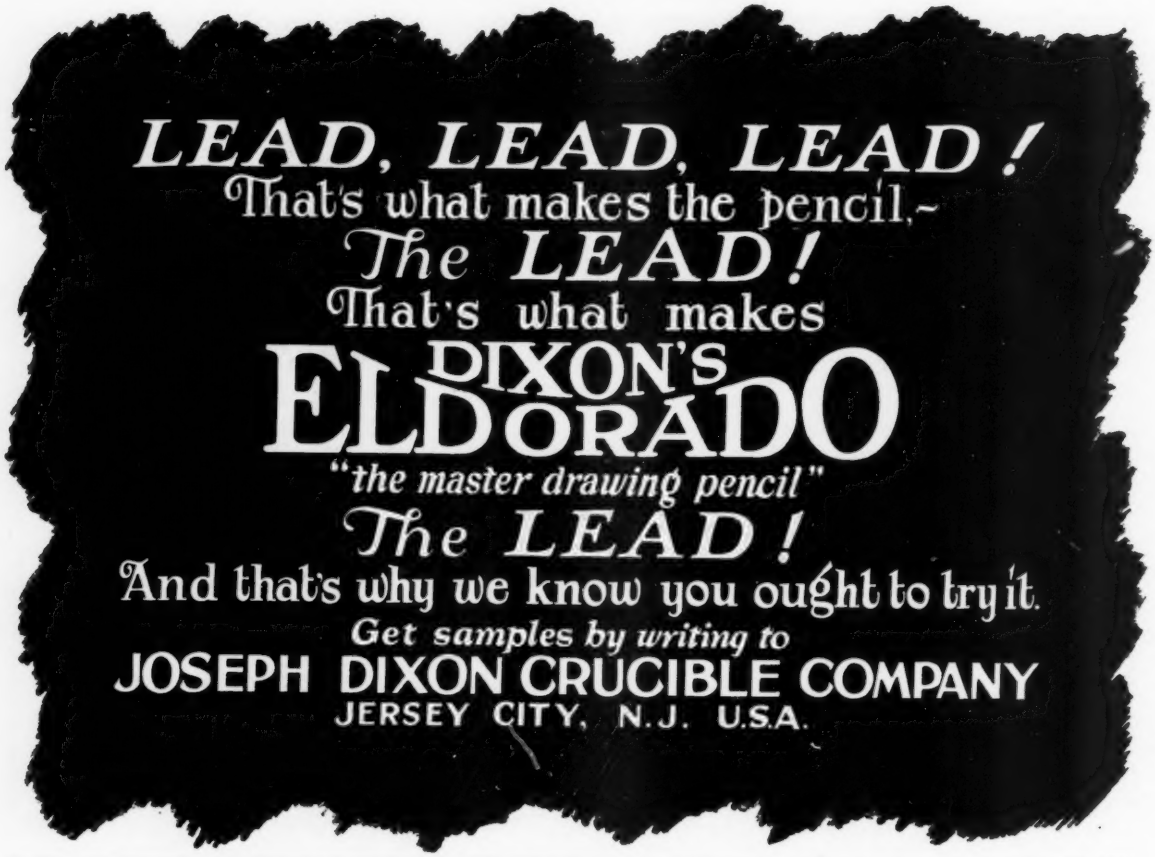
The industrial education division conducted evening classes for the instruction of 1,098 adults, aiding them to better carry on in their daily employment, organized and taught foremanship training classes in several large industrial plants, conducted a summer conference at the state university, reached 295 boys and girls of employable age in the textile industry, and gave instruction in retail selling to women employed as saleswomen at several important centers.

The home economics division through special vocational courses reached 1,366 young women in 38 schools, gave evening instruction to adult women, and offered supervision to state institutions offering home economics courses.

Industrial Subjects in Texas Schools. One year has passed since the revision of the "rural aid" law of Texas, providing that state aid not to exceed $250 shall be given to schools for equipment to be used in the teaching of industrial subjects. During this time, a total of 180 schools located in 65 counties of rural districts, have received aid under the act. The state education department of Texas has recently issued a bulletin showing what has been accomplished in a year, the requirements of rural schools seeking state aid for the work, and instructions for qualifications.

Vocational School. The board of education of Port Huron, Mich., has opened a well-equipped vocational school. The Port Huron Times, commenting on this action, says: "Some boys and girls must work with their hands largely; and some must work mostly with their minds. With others it may be largely the labor of the soul. All of these must be prepared for some part of this work. The earlier in life this preparation can be commenced, without at the same time neglecting the cultural things which make men and women larger-minded and better citizens, and fathers and mothers, the better it is going to be for the community, the state and the nation—yes, and for the world."

Ask Shorter Hours. The trade school teachers of New York City have asked that their teaching hours be reduced to those of other teachers in the school system. Paul Augustine, who represents the vocational teachers, says: "The arguments advanced in support of the present



policy, casts a reflection of inferiority on the type of pupils attending these schools, and tends to lower the vocational and trade schools in the estimation of the public, prospective students and professional associates of the teachers. He characterized as 'unsound' the argument that longer hours are necessary to bridge the gap between school time and shop time, and points out that the growing tendency in industry is to decrease the hours of work and that public policy has supported the tendency."

Plan County Vocational School. The board of education of Newark, N. J., plans the transfer of its boys' vocational and building trades school to the county. The offer made by the county is $950,000, and the board asks for $1,300,000. The plan is to place the school under both city and county direction, with like privileges accorded to the constituency of both.

Manual Arts Addition. The United Township High School at East Moline, Ill., has erected a two-floor addition to the manual arts annex. The general contract, exclusive of equipment, amounted to $37,844. It provides for seven new departments and two lavatory and rest-room units.

Purchase New Equipment. The board of education of Chicago has purchased 53 lathes from the Sidney Machine Tool Co., Sidney, O., for use in the Crane Technical high school shops.

Ruling on Pay Problems. Under action taken by the New York board of education, the appointment of a vocational or trade school teacher to high school classes is not considered a promotion and entitles the teacher only to the salary of the high school schedule in accordance with his years of service.

Shop Classes Overcrowded. The enrollment of new pupils in mechanic arts classes at the boys' high school, Paterson, N. J., has crowded the four shops far above capacity. Upon the recommendation of the superintendent, the board has established a temporary shop in the basement of the school and has employed an additional shop teacher to take charge.

Vocational Work Aided. The board of education of Lansing, Mich., has received $6,786 for vocational work and $717 for home economics work this year under the terms of the Smith-Hughes and Tufts laws. The amounts represent nearly five per cent more than was received from the same source last year.

Household Arts Course. With the opening of the fall term, girls in the schools of Oakland, Calif., have entered upon a course in household arts. The course includes such subjects as interior decorating, house planning, care of furnishings and clothing and etiquette for all occasions.

Raise Building Fund. The state of Georgia recently completed a campaign to raise $20,000 for the enlargement and improvement of the Tallulah Falls Industrial School, in Atlanta. The plans provide for an eight classroom building, a craft house, guest house and auditorium. The craft house has been named in honor of Mrs. McGregor Adams, who has rendered splendid service in equipping the craft house and in assisting in the raising of the building fund. Mr. W. S. Witham has donated $1,000 to the educational fund. Five children are to be sent to school at his expense.

Organize Vocational School. A vocational school for miners has been organized at Bellaire, W. Va.

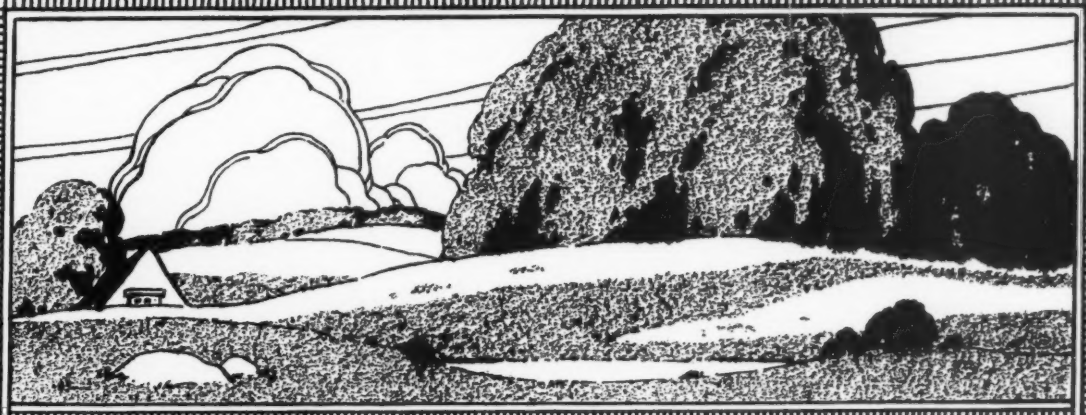
Occupy New Building. The occupancy of the new building constructed by the pupils of the County Boys' Vocational School, at Newark, N. J., was a feature of the re-opening of the school in September. The new building permits accommodations for sixty more than were cared for last year. The school offers work in carpentry, electricity, auto-mechanics, machine and tool making, and mechanical drawing. Each course requires three years to complete.

Aid for Vocational Work. Under the Smith-Hughes law, $56,000 federal aid will be given to Texas this year, in addition to $67,000 from the state, making a total of $123,000 to aid cities where vocational classes have been established. Of the total, El Paso receives $20,000 this year. El Paso was one of the first Texas cities to establish trade training and it is now one of four cities in the south engaged in vocational work.

Transfer Manual Training Classes. Due to crowded conditions, manual training classes in the high school and Johnson School at Lexington, Ky., have been moved to the Industrial School building. The change gives the high school the much needed classrooms and concentrates all the shop work in one building.

New Improvements in high school. The entire manual

(Continued on Page 29a)



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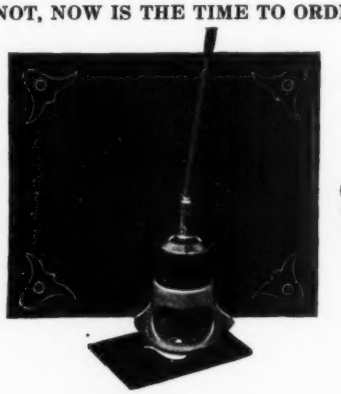

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(Continued from Page 26a)

arts department at Three Rivers, Mich., has been improved with the addition of new machines and equipment and the addition of new courses. The wood shopwork in the high school and grades has been taken in charge by Mr. Leo Hanley, leaving Mr. Emery Smith free to supervise the high school department and the work being done in the machine shop. The wood shop has had added to its equipment an Oliver turning lathe. In the machine shop, three new machines have been installed for turning out the work more efficiently. A new bench has been installed in the household mechanics department in connection with the opening of a new course in this subject for the benefit of the seventh and eighth grade students.

A new course in auto-mechanics has been established to give the students training in the care and repair of their own cars, and to prepare the way for a more complete course later. The course in mechanical drawing has been revised to provide a more extensive course giving practical advantages.

Discontinue Commercial Cooking Course. Commercial Cooking has been dropped from the vocational high school course at Minneapolis, Minn., the school officials deeming it a waste of time not only for the students taking it but also for the school itself. Of fourteen pupils who entered the trade, twelve have left, the average length of time of work being one year.

Establish Trade School. A trade school for the teaching of carpentry and electricity has been established in the high school at Springfield, Mo. The plan also includes evening courses for men already in the trades. Work in applied English and mathematics will be offered in connection with the courses.

Radio Classes Opened. Radio work is being offered at the Roosevelt High School, San Francisco, Calif., as preparation for the navy and for commercial purposes. The course includes code work, a study of national, federal and corporation laws and rules, storage batteries, theory and care of apparatus. The course prepares students for the federal examinations for licensed operators.

New Courses to Replace Woodwork. Cold iron work has replaced woodwork for the first semester in the eighth grade of the Washington school, Rock Island, Ill. If the change proves successful, the plan will be extended to other schools.

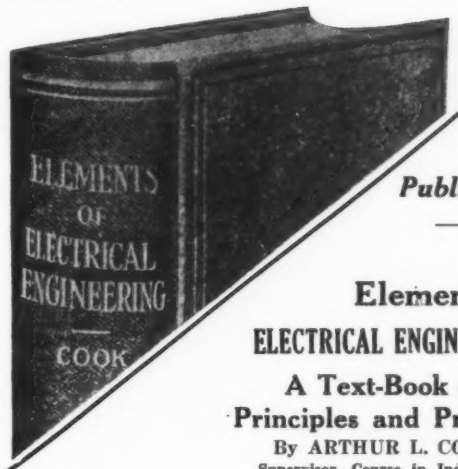
Carpenters Ask Trade Training. The carpenters' union of Decatur, Ill., in cooperation with the contractors and architects, has presented a petition to the school board asking that vocational training be introduced in the schools for young men learning the trade. This is the first workers' union to take action along this line, although several other unions have contemplated the same action. It is the belief of men connected with the union that the solution of the apprenticeship problem lines in the vocational training school. The insistent demand for production, coupled with high wages and high material costs, are factors that discourage the contractors from devoting time to the training of young mechanics. The union recognizes the value of education and is determined to see that vocational training is offered to apprentices in the trade.

New Vocational Work. The high school at Wilmington, Del., is planning the establishment of a course for laboratory technicians. It is planned to enroll boys and girls over 16 years of age for the course, the number of students to be limited to those who can be employed by the industries. A special course has been arranged by the local chemists and engineers, which includes also a "try out" course for those about to seek employment.

Seneca Vocational School. Plans have been completed for the new Seneca Vocational School, to be erected at Buffalo, N. Y., at a cost of $450,000.

Apprentice Training Provided. A school for apprentice training in the building trades at Springfield, Mass., providing four-year courses in the theory and practice of the several trades has been proposed by the local building trades employers' association. It is estimated that the system will require an investment of $150 for each apprentice but it also means an actual saving to them in the securing of skilled workers.

Urges Trade Schools. The establishment of schools for the industrial arts and trades, eventually superseding the apprenticeship methods of gaining vocational competency has been suggested by Dr. David Snedden, Columbia University. Speaking on the subject before a gathering of teachers of industrial arts, Dr. Snedden declared that five per cent of the country's workers gain their training by the apprenticeship method, five per cent by the vocational method, and 90 per cent by the pick-up method.



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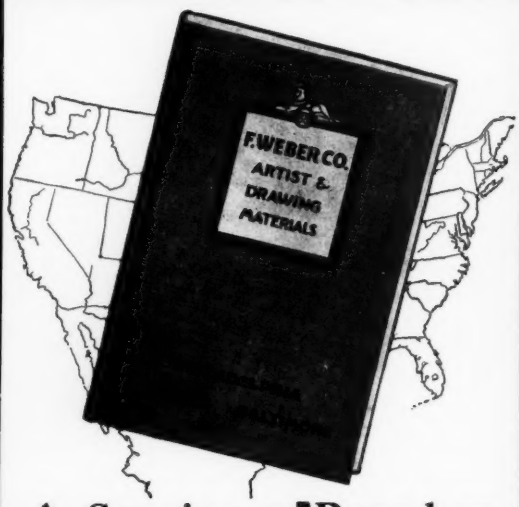

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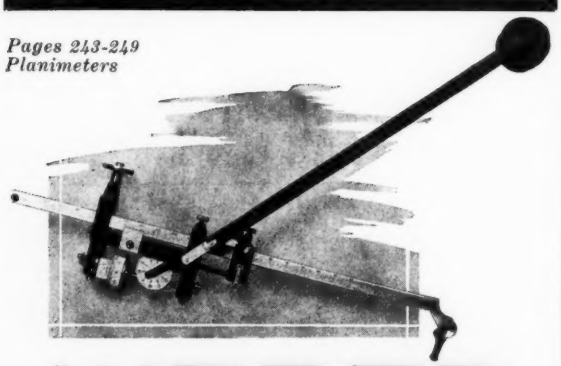

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The pick-up method, he said, kills dozens of workers and the country is coming to realize that this method is expensive and inefficient.

Apprenticeship training is breaking down from within and without and employers don't care for apprentices. The same is true of the unionist. He does not want to be bothered with the apprentice. This leaves the problem entirely with the vocational school.

Demand Vocational Teachers. The call for well-trained teachers of vocational subjects in Iowa schools has increased rapidly within the last few years, according to Prof. W. H. Lancelot, of the department of Vocational education, Iowa State College. He points out that of this year's graduating class in home economics at the College, 109 have gone into school work, compared with 60 who went into the same field a year ago. Fifty-eight undergraduates in home economics expect to teach as compared with 36 who had similar positions a year ago.

A similar increase has been noted in the number of persons engaged to teach agriculture during the present school year, the increase amounting to about thirty per cent. Approximately 75 Iowa schools are teaching vocational agriculture this year as compared with 56 last year.

Approve New Schools. Fifty-six new vocational schools in Mississippi have been approved for state and federal aid this year.. This increases the total number of Smith-Hughes schools from 162 last year to 218 this year. Of the total number, 97 are teaching vocational agriculture, 55 home economics, and the remainder trade and industrial subjects.

Extend Manual and Domestic Arts. At Greenfield, Mass., the work in manual and domestic arts has been extended in scope with the opening of a new high school building. The domestic science department has been provided with a suite of rooms, as well as a large sewing room and a kitchen. The woodworking department is fully equipped with benches, hand tools and lathes, as well as the usual wood working machines. The drafting department which is quite complete in layout, accommodates twenty-two pupils. The printshop which accommodates sixteen compositors at one time is complete, including three platen presses.

The high school offers a number of special manual arts courses, and many students elect the shop work even though enrolled in other courses. The former high school shops have been converted into shops for regular grade classes.

New Textbook. "Industrial Mathematics" is the title of a textbook written by D. W. Werremeyer of the West Technical High School, Cleveland, and published by the Cleveland board of education. The book is being used in the high schools and junior high schools of the city.

Concordia, Kans. Farm shop work has been substituted for one of the courses in cabinet making.

Home Making Course. At Concordia, Kans., the board has converted a residence on the high school site into a teaching center for vocational home making classes operated under the Smith Hughes law. About forty girls are enrolled in the course.

Henderson, Ky. The Douglas High School, a high school for colored students, was recently opened for use. The school will specialize in vocational and industrial courses. It is well equipped and is considered one of the best colored high schools in the state.

Interesting Report on Binding. The bindery department of the State Teachers' College, Greeley, Colo., recently issued a special report covering the work accomplished by 85 college students, a class of twelve high school pupils, and seven pupils from the elementary school, making a total of 104. The classes bound volumes, made special covers, and mounted maps, making a total of 129 problems. The cost to the college for all the work was $68.65, while the commercial value was estimated at $222.

The bindery work was carried out during the first six weeks of the quarter; the remainder of the quarter was devoted to work chosen by the students themselves. The cost to the students for this work was $687 for leather and other materials.

The total number of problems completed by the college students was 700, at an estimated cost of $638. The total number completed by the high school students was 33, at a cost of $33, and the total number completed by the elementary pupils was 33, at a cost of $15. The commercial value of the 766 articles was $2,052. The grand total for materials used and for individual problems completed by the students amounted to $756, while the grand total commercial value of bindings, leather work and problems was $2,275. This left a credit to the college bindery department of a little over $1,500.

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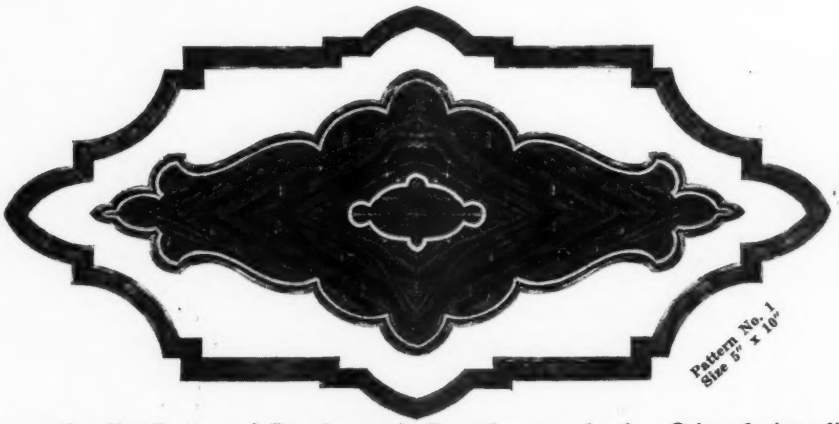

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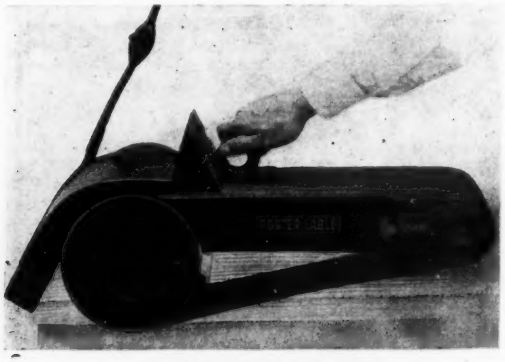
New Belt Sander and Grinder. The Porter-Cable Co., of Syracuse, N. Y., has announced the marketing of a small belt sander and grinder suitable for use on benches in school shops. The machine is provided with a grinding bed of 6 x 18 inches which may be tilted to a horizontal or vertical position, making it suitable for many different operations and eliminating the cost of two machines.

The machine is useful for grinding small pieces rapidly. It is driven by a one-half horsepower motor, directly connected by a 7½-inch drive pulley. In work requiring a curved surface, the upper pulley may be used satisfactorily as a semi-circular spindle.

The table which is provided with an angle gauge, is removable for work requiring the full use of the grinding bed, or as a stop when placed in the horizontal position. The dust hood may be taken off in a few seconds. A portable pedestal is available for use where the shop work is of a scattered character.

The machine is designed to meet the need of the shop worker for a rapid, convenient and accessible bench tool. Information concerning the sander and grinder may be obtained by writing the firm at Syracuse, N. Y.



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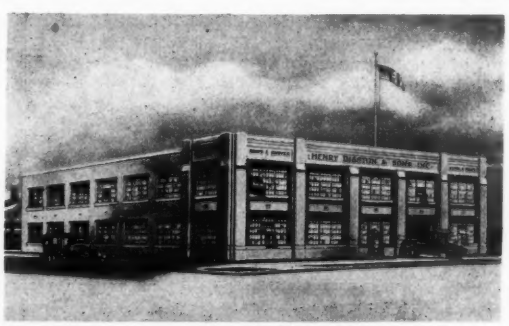
Copies of the catalog are vailable to manual training instructors by addressing the firm at Anoka, Minnesota.

New Disston Factory Operating in Seattle. Henry Disston & Sons, Inc., have begun the operation of a new branch factory in Seattle, Washington. This plant is the largest saw works on the Pacific Coast. It is equipped



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tooth saws, and retooth, braze, and piece band saws of every gauge. The plant is also equipped to make, from Disston Steel, every type and style of knife used in the lumbering industries including carbon and inlaid knives, moulding knives, and shear blades, as well as repair all types of knives.

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PERSONAL NEWS

Mr. H. J. Demkler has been appointed instuctor in machine shop work at the senior high school, Dubuque, Ia.

Miss Beryl Evens has been reappointed as director of domestic science at Midland, Mich.

Mr. C. L. Kayl, formerly director of manual arts work at Sault Ste. Marie, Mich., has accepted a similar position at Aurora, Ill. Mr. Kayl is succeeded by Mr. J. Alfred Nelson, formerly an instructor of mechanical drawing in the Sault Ste. Marie schools.

Mr. Robert A. Hardin has been appointed as instructor in manual training in the Nebaska Wesleyan University at University Place.

Mr. E. H. Bobbitt has recently been appointed head of the department of school printing of the San Francisco branch of the American Type Founders Company. Mr. Bobbitt is both a practical printer and teacher and during the past year had charge of the class in printing at the Ethan Allen School, San Francisco. Mr. Bobbitt is peculiarly fitted to give advice on school printing outfits and their cost.

Mr. Stephen E. Patrick of Westbrook, Me., has been appointed as state director of vocational education, to succeed Everett K. Jenkins. Mr. Patrick was made director of manual arts in Westbrook in 1919. Previous to that time he acted as director of trades and industries in the Portland high school and director of the industrial department in the Westbrook high school.

Mr. F. E. Land, state director of vocational education in Georgia, has announced his candidacy for the office of state superintendent of public instruction.

Mr. William Hays has been appointed instructor in manual training at School No. 2 Paterson, N. J., and Mr. Henry Holtz in the same capacity at School No. 6.

Catalog of Films. Under the title of Miscellaneous Circular 27, the U. S. Department of Agriculture has announced the publication of a catalog containing 182 motion picture films dealing with a wide range of agricultural subjects. The films may be loaned for educational purposes upon the payment of a small charge for transportation both ways.

The films are intended to aid in the work of extension and field workers of the department and cooperating state institutions.

Cooperative Industrial Education. At the Anderson high school, Anderson, Ind., twenty boys have taken advantage of the cooperative plan of vocational education adopted by the vocational department and the Remy factory. The boys will spend one week in school and the following week in work at the factory. The number of boys is limited to twenty.

The school reports that 171 students are at present enrolled in vocational classes. These are divided among classes in printing, machine-shop work, pattern making, drafting, carpentry and home economics.

Evening Classes. The evening school season opened at Buffalo, N. Y., with 27 centers given to evening school instruction. A new course in practical home decoration has been introduced at the Hutchinson high school in response to an urgent demand.

Students Erect Buildings. Students in building-trade clases at Aurora, Ill., will construct actual buildings this year. A lot has been purchased, upon which the students will build a model bungalow. A kindergarten building will also be erected on the school grounds.

Under the plan, workmen will be employed to do the more difficult work, but the students will perform practically all the construction work. Upon its completion, the bungalow will be sold and the proceeds revert back to the school.

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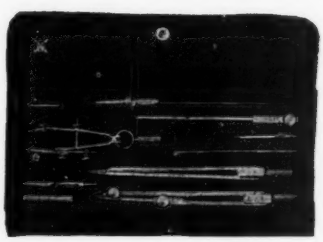

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